U. S. SPACE FORCE INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Cheyenne Mountain Space Force Station

(See INRMP signature pages for plan approval date)

ABOUT THIS PLAN

This installation-specific Environmental Management Plan (EMP) is based on the U.S. Air Force's (AF) standardized Integrated Natural Resources Management Plan (INRMP) template. This INRMP has been developed in cooperation with applicable stakeholders, which may include Sikes Act cooperating agencies and/or local equivalents, to document how natural resources will be managed. Non-U.S. territories will comply with applicable Final Governing Standards (FGS). Where applicable, external resources, including but not limited to both Air Force Instructions (AFIs); Space Force Instructions (SFIs); AF Playbooks; Air Force Manuals; federal, state, local, FGS, biological opinion and permit requirements, are referenced.

Certain sections of this INRMP begin with standardized, AF-wide "common text" language that address AF and Department of Defense (DoD) policy and federal requirements. This common text language is restricted from editing to ensure that it remains standard throughout all plans. Immediately following the AF-wide common text sections are installation sections. The installation sections contain installation-specific content to address local and/or installation-specific requirements. Installation sections are unrestricted and are maintained and updated by AF environmental Installation Support Teams (ISTs) and/or installation personnel.

NOTE: The terms 'Natural Resources Manager', 'NRM' and 'NRM/POC' are used throughout this document to refer to the installation person responsible for the natural resources program, regardless of whether this person meets the qualifications within the definition of a natural resources management professional in DODI 4715.03.

TABLE OF CONTENTS

ABOUT THIS PLAN **2**
TABLE OF CONTENTS **3**
DOCUMENT CONTROL **6**
INRMP APPROVAL/SIGNATURE PAGES **6**
EXECUTIVE SUMMARY **8**
1.0 OVERVIEW AND SCOPE **10**
1.1 Purpose and Scope **10**
1.2 Management Philosophy **11**
1.3 Authority **12**
1.4 Integration with Other Plans **13**
2.0 INSTALLATION PROFILE **14**
2.1 Installation Overview **14**
2.1.1 Location and Area 14
2.1.2 Installation History 16
2.1.3 Military Missions 17
2.1.4 Surrounding Communities 18
2.1.5 Local and Regional Natural Areas 19
2.2 Physical Environment **19**
2.2.1 Climate 19
2.2.2 Landforms 20
2.2.3 Geology and Soils 22
2.2.4 Hydrology 23
2.3 Ecosystems and the Biotic Environment **24**
2.3.1 Ecosystem Classification 24
2.3.2 Vegetation 26
2.3.3 Fish and Wildlife 30
2.3.4 Threatened and Endangered Species and Species of Concern 32
2.3.5 Wetlands and Floodplains 36
2.3.6 Other Natural Resource Information 36
2.4 Mission Impacts on Natural Resources **37**
2.4.1 Natural Resource Constraints to Mission and Mission Planning 37
2.4.2 Land Use 39
2.4.3 Current Major Impacts 41
2.4.4 Potential Future Impacts 41
2.4.5 Natural Resources Needed to Support the Military Mission. 43
3.0 ENVIRONMENTAL MANAGEMENT SYSTEM **43**
4.0 GENERAL ROLES AND RESPONSIBILITIES **43**
5.0 TRAINING **44**
6.0 RECORDKEEPING AND REPORTING **45**
6.1 Recordkeeping **45**
6.2 Reporting **45**

7.0 NATURAL RESOURCES PROGRAM MANAGEMENT **45**
7.1 Fish and Wildlife Management **46**
7.2 Outdoor Recreation and Public Access to Natural Resources **48**
7.3 Conservation Law Enforcement **48**
7.4 Management of Threatened and Endangered Species, Species of Concern and Habitats **49**
7.5 Water Resource Protection **52**
7.6 Wetland Protection **53**
7.7 Grounds Maintenance **53**
7.8 Forest Management **54**
7.9 Wildland Fire Management **56**
7.10 Agricultural Outleasing **59**
7.11 Integrated Pest Management Program **59**
7.12 Bird/Wildlife Aircraft Strike Hazard (BASH) **64**
7.13 Coastal Zone and Marine Resources Management **65**
7.14 Cultural Resources Protection **65**
7.15 Public Outreach **65**
7.16 Geographic Information Systems (GIS) **65**

8.0 MANAGEMENT GOALS AND OBJECTIVES **66**

9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS **67**
9.1 Natural Resources Management Staffing and Implementation **67**
9.2 Monitoring INRMP Implementation **68**
9.3 Annual INRMP Review and Update Requirements **68**

10.0 ANNUAL WORK PLANS **69**

11.0 REFERENCES **71**
11.1 Standard References (Applicable to all AF installations) **71**
11.2 Installation References **71**

12.0 ACRONYMS **74**
12.1 Standard Acronyms (Applicable to all AF installations) **74**
12.2 Installation Acronyms **74**

13.0 DEFINITIONS **75**
13.1 Standard Definitions (Applicable to all AF installations) **75**
13.2 Installation Definitions **75**

14.0 APPENDICES **76**
Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP **76**
Appendix B. Cheyenne Mountain SFS Plant Species List **82**
Appendix C. Cheyenne Mountain SFS Wildlife Species List **89**
Appendix D. USFWS National Wetlands Inventory Map for Cheyenne Mountain SFS **92**
Appendix E. Cheyenne Mountain SFS Natural Resource Reports and Plans. **93**
Appendix F. Mexican Spotted Owl Survey Protocols **96**
Appendix G. Plant Species Suitable for Cheyenne Mountain SFS's Soils and Elevational Range **117**
Appendix H. Business Practices for Environmental Compliance for Projects and Services **118**

15.0 ASSOCIATED PLANS **122**
Tab 1 – Wildland Fire Management Plan **122**
Tab 2 – Bird/Wildlife Aircraft Strike Hazard (BASH) Plan **122**
Tab 3 – Golf Environmental Management (GEM) Plan **122**
Tab 4 – Integrated Cultural Resources Management Plan (ICRMP). **122**
Tab 5 – Integrated Pest Management Plan (IPMP) **122**

DOCUMENT CONTROL

Record of Review – The INRMP is updated not less than annually, or as changes to natural resource management and conservation practices occur, including those driven by changes in applicable regulations. In accordance with (IAW) the Sikes Act and AFMAN 32-7003, *Environmental Conservations*, the INRMP is required to be reviewed for operation and effect not less than every five years. Annual reviews and updates are accomplished by the base Natural Resources Manager (NRM), and/or an Installation Support Team Natural Resources Media Manager. The installation shall establish and maintain regular communications with the appropriate federal and state agencies. At a minimum, the installation NRM (with assistance as appropriate from the NR Media Manager) conducts an annual review of the INRMP in coordination with internal stakeholders and local representatives of the United States Fish and Wildlife Service (USFWS), state fish and wildlife agency, and National Oceanic and Atmospheric Administration (NOAA) Fisheries, where applicable, and accomplishes pertinent updates. Installations will document the findings of the annual review in an Annual INRMP Review Summary. By signature to the Annual INRMP Review Summary, the collaborating agency representative asserts concurrence with the findings. Any agreed updates are then made to the document, at a minimum updating the work plans.

INRMP APPROVAL/SIGNATURE PAGES

This Integrated Natural Resources Management Plan (INRMP) for the Cheyenne Mountain Air Force Station, Colorado, meets the requirements of the Sikes Act (16 U.S.C. 670a et seq.) as amended and has been prepared in accordance with regulations, standards, and procedures of the Department of Defense and the United States Air Force. To the extent resources permit, the United States Air Force Academy will implement the actions associated with this plan and will strive to meet its goals and objectives.

Statement of Operation and Effect:

By their signatures below, all parties grant their concurrence and acceptance, having reviewed this plan, and agree that its goals and objectives contribute to the regional conservation and management of wildlife, forests, rare species, aquatic and terrestrial habitats, and wildland fuel hazards; and provide outdoor recreation opportunities.

11/14/19

FOR NOREEN WALSH
Director, Region 6
U.S. Fish and Wildlife Service

Date

12/11/19

BRETT ACKERMAN
Southeast Region Manager, Colorado Parks & Wildlife

Date

14 JAN 2020

THOMAS G. FALZARANO, Colonel, USAF
Commander, 21st Space Wing

Date

Cheyenne Mountain Air Force Station
Integrated Natural Resources Management Plan

Annual Natural Resources Program Review – 2020

Focus Area	CPW	USFWS	CMAFS
INRMP is implemented in accordance with the stated goals and objectives; INRMP programs are adequately funded considering the current budget climate.	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory
Coordination and partnership between the agencies effectively implements the Sikes Act requirements.	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory
Implementation of the INRMP and Sikes Act requirements has a positive impact on the installation's natural resources and mission.	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory
The integrity of installation ecosystems and natural resources is maintained or improving.	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory
Consistent with the installation mission; opportunities for fish and wildlife management are supported and encouraged.	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory
CPW, USFWS, and CMAFS have an adequate team assembled to address natural resource issues on the installation.	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory	Satisfactory or Unsatisfactory

Colorado Parks and Wildlife Representative _____ 12/22/2020
Date

U.S. Fish and Wildlife Service Representative _____
Date

Cheyenne Mountain Air Force Station Representative _____ 12/23/20
Date

Cheyenne Mountain Air Force Station
Integrated Natural Resources Management Plan

Annual Natural Resources Program Review – 2020

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Colorado Parks and Wildlife Representative _____ Date

U.S. Fish and Wildlife Service Representative PAMELA SPONHOLTZ Digitally signed by PAMELA SPONHOLTZ Date: 2020.12.12 07:22:41 -07'00' Date

Cheyenne Mountain Air Force Station Representative _____ 12/23/20 Date

EXECUTIVE SUMMARY

The Integrated Natural Resources Management Plan (INRMP) provides guidance for the management and long-range planning for lands managed by Cheyenne Mountain Space Force Station (SFS) in Colorado. Space Force natural resources management programs are designed to ensure continued access to land and airspace required to accomplish the military mission by maintaining the integrity of resources. In order to accomplish this, the natural resources management program at Cheyenne Mountain SFS emphasizes environmental stewardship as well as compliance with federal, state, and local regulatory and statutory requirements that encompass potential environmental impacts, water and air quality, fire mitigation, threatened and endangered species (TES), migratory birds, and other wildlife.

The emphasis of the INRMP is development of an ecosystem management approach at Cheyenne Mountain SFS that bases planning decisions considering the interrelationships among the natural resources on and around the installation. The INRMP outlines a plan to implement this strategy by identifying:

- baseline information on the physical and biotic environment;
- the military mission and its potential effects on natural resources;
- recommended goals, objectives, and projects for key natural resource management areas; and,
- personnel, funding, and support required for implementation of the INRMP, including projects and opportunities, for with stakeholders in the implementation process.

The INRMP serves as the 21st Mission Support Group (MSG) Commander's decision document for natural resources management actions and associated compliance procedures. The INRMP integrates the installation's natural resources management program with ongoing mission activities to conserve and protect natural resources in support of the military mission for present and future generations.

The INRMP combines natural resource management policies for and data from Cheyenne Mountain SFS to produce a guidance document that recognizes the objectives of the Cheyenne Mountain SFS mission. The INRMP provides guidance to assist managers in making day-to-day decisions that allow for protection of natural resources. In order for the natural resources management program to be successful, it must take into account past, present, and future initiatives undertaken by both the installation and in the surrounding area.

Key natural resource management issues at Cheyenne Mountain SFS include forest health, wildland fire prevention, erosion control, weed and pest control, and wildlife distribution and habitat. Management goals and objectives to address these issues have been defined based on regulatory requirements and projected trends. Projects are also identified that directly link management objectives and regulatory drivers. Implementation schedules aid in planning for resource allocation. Specifically, Cheyenne Mountain SFS natural resource projects include:

- Maintain a compliant Cheyenne Mountain SFS INRMP
- Maintain a healthy ecosystem compatible with mission requirements
- Wildland fire mitigation
- Natural resources protection

This INRMP was developed in 2014. Annual reviews with the U.S. Fish and Wildlife Service (USFWS) and Colorado Parks and Wildlife (CPW) will ensure that the INRMP remains current and relevant. Major revisions are not required as long as the signatory stakeholders concur that the annual updates maintain the currency and purpose of the plan. If it is determined that any of the proposed actions contained in this

INRMP require an environmental assessment, the process will be initiated and completed prior to implementation of the action in accordance with the National Environmental Policy Act (NEPA).

On April 5, 2019 the 721st Mission Support Group was inactivated and realigned with the 21st Mission Support Group. Any reference to the 721st found in this document is incorporated as a historical reference only.

On 20 December 2019, as part of the 2020 National Defense Authorization Act, United States Space Force was established as the sixth armed services branch. As part of the restructuring associated with this change, Cheyenne Mt. Air Force Station became Cheyenne Mt. Space Force Station on 26 July 2021. The Space Force is managed under the Department of the Air Force and, as such, many of the governing documents under which this plan is written are Air Force publications. Throughout this plan there are many references to both Air Force and Space Force. These reference are true and correct at the time of this writing, but are subject to change.

1.0 OVERVIEW AND SCOPE

This INRMP was developed to provide for effective management and protection of natural resources. It summarizes the natural resources present on the installation and outlines strategies to adequately manage those resources. Natural resources are valuable assets of the Department of the Air Force. They provide the natural infrastructure needed for testing weapons and technology, as well as for training military personnel for deployment. Sound management of natural resources increases the effectiveness of Space Force adaptability in all environments. The Space Force has stewardship responsibility over the physical lands on which installations are located to ensure all natural resources are properly conserved, protected, and used in sustainable ways. The primary objective of the Space Force natural resources program is to sustain, restore and modernize natural infrastructure to ensure operational capability and no net loss in the capability of AF lands to support the military mission of the installation. The plan outlines and assigns responsibilities for the management of natural resources, discusses related concerns, and provides program management elements that will help to maintain or improve the natural resources within the context of the installation's mission. The INRMP is intended for use by all installation personnel. The Sikes Act is the legal driver for the INRMP.

1.1 Purpose and Scope

The INRMP sets forth a single, unified management philosophy, strategy, and framework for the protection, conservation, use, and management of natural resources at Cheyenne Mountain SFS. In general, the INRMP includes overviews and general information. The INRMP is a key component of the Installation Development Plan, which provides background and rationale for the policies and programming decisions related to land use, resource conservation, facilities and infrastructure development, and operations and maintenance such that they meet current requirements and support future growth. Associated plans, such as the Wildland Fire Management Plan and the Forest Management Plan, contain detailed management procedures, management objectives, and subject specific information. Natural resource related goals and objectives from those plans are contained in this INRMP. This document is intended to fulfill the requirements of the Sikes Act Improvement Act as discussed within Air Force Manual (AFMAN) 32-7033, Environmental Conservation.

As identified in the Sikes Act Improvement Act (SAIA), INRMPs must address the following:

- the conservation and rehabilitation of natural resources on military installations;
- the sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and non-consumptive uses, within the parameters of safety and security specific to the installation;
- fish and wildlife, land, and forest management;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants;
- integration of, and consistency among, the various activities conducted under the plan;
- establishment of specific natural resource management goals, objectives, and time frames for proposed actions;
- sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, and is within the parameters of safety and security specific to the installation;
- public access to the military installation that is necessary or appropriate subject to the requirements necessary to ensure safety and military security;

- enforcement of applicable natural resource laws (including regulations); and,
- no net loss in the capability of military installation lands to support the military mission of the installation. Due to security restrictions at Cheyenne Mountain SFS, public access is prohibited; however, multipurpose use within mission constraints is addressed in this plan.

This INRMP outlines the steps needed to fulfill compliance requirements related to natural resources management and provide for environmental stewardship at Cheyenne Mountain SFS. The document is organized into four principal sections: current status and conditions of the natural resources, identification of potential impacts on natural resources, key natural resource management areas to be addressed based on projected trends, and specific scheduled tasks for effective implementation of the INRMP.

1.2 Management Philosophy

The INRMP presents broad guidance on Cheyenne Mountain SFS as well as specific goals, objectives, and projects for the management of natural resources. As the cornerstone of INRMP implementation, ecosystem management ensures that military lands support present and future operational requirements while preserving, improving, and enhancing ecosystem integrity. Ecosystem management aims to link the ecological processes of soils, plants, animals, minerals, climate, water, and topography. These processes are viewed as a living system that affects and responds to human activities. This approach considers natural resources at an ecosystem level, rather than at the single species level. The INRMP establishes goals for attaining a desired land condition within the ecosystem. Via this INRMP, Cheyenne Mountain SFS will ensure that overall ecosystem functions and sustainability are not compromised. Because of the relatively small size of Cheyenne Mountain SFS, conservation of many natural resources depends on coordination and cooperation with federal, state, and local agencies and stakeholders.

This INRMP has been developed in an interdisciplinary manner and coordinated with the Installation Development Plan (i.e., the installation's comprehensive planning process). A mutual exchange of information between this INRMP and the Installation Development Plan has ensured that the two plans are consistent and complementary. The INRMP integrates all management activities and plans potentially dependent or interfacing with natural resources at Cheyenne Mountain SFS.

The INRMP was developed by identifying and integrating mission requirements with all aspects of natural resources management, including but not limited to:

- Habitat enhancement
- Invasive species management
- Climate change
- Regulatory requirements
- Landscaping and grounds maintenance

The INRMP integrates these requirements into an overall plan so that the different aspects of natural resources management complement each other and contribute to the overall goal of a healthy diverse ecosystem capable of supporting the military mission into the foreseeable future.

Rare species are important components of ecosystems and biodiversity. In addition, rare species are often provided legal protection; therefore, they must be considered during project planning in relation to natural resources management.

At its inception, the Cheyenne Mountain SFS INRMP was prepared and reviewed by a team of interdisciplinary professionals from both within and outside the installation with technical expertise in the areas of ecology, soil science, environmental sciences, engineering, safety, biology, entomology, environmental law, and recreation.

Resources required to implement this plan will be programmed for within the Environmental Quality (EQ) budget in accordance with Planning, Programming, Budgeting and Execution (PPBE) guidance. Goals and objectives will not be fully realized unless appropriations are requested and funded. The projects presented in this INRMP have been prioritized in consideration of the fact that the installation and the Space Force are operating in a fiscally constrained environment.

1.3 Authority

The following federal, DoD, Air Force, and state regulations, directives, and instructions are cited as authorities for this plan:

- Sikes Act of 1960, as amended (16 U.S.C. 670 *et seq*.)
- Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543)
- Migratory Bird Treaty Act, as amended (16 U.S.C. 701 *et seq*.)
- Economy Act of 1932, as amended (31 U.S.C. 1535)
- Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d)
- Federal Noxious Weed Act of 1976 (7 U.S.C. 2801)
- Executive Order 13352, Facilitation of Cooperative Conservation; August 26, 2004
- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds; January 10, 2001
- Executive Order 13112, Invasive Species; February 3, 1999
- DoD Directive 4715.21, Climate Change Adaptation and Resilience; January 14, 2016
- DoD Instruction 4715.03, Natural Resources Conservation Program; August 31, 2018
- DoD Manual 4715.03, Integrated Natural Resources Management Plan (INRMP) Implementation Manual; August 31, 2018
- DoD Memorandum, Sikes Act Implementing Procedures – Clarifying the Role of the U.S. Fish and Wildlife Service (USFWS) and State Agencies; June 20, 2014
- Department of Defense (DoD) Policy to Use Pollinator-Friendly Management Prescriptions; September 5, 2014
- AFMAN 32-7003, Environmental Conservation; April 20, 2020
- AFI 32-1053, Integrated Pest Management Program; August 6, 2019
- Memorandum of Understanding Between the U.S. Department of Defense and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds; September 5, 2014
- Memorandum of Understanding between the Department of Defense and the Pollinator Partnership; February 9, 2015
- Colorado Noxious Weed Act, Colorado Revised Statute (CRS) Title 35 Article 5.5-10

Installation-Specific Policies (including State and/or Local Laws and Regulations)	
	•

1.4 Integration with Other Plans

The INRMP incorporates information from associated management plans (e.g., Wildland Fire Management Plan, Forest Management Plan) and, likewise, information from this document will be integrated into the installation comprehensive planning process. The INRMP supports the natural resources component of the Installation Development Plan by integrating all aspects of natural resources management with the installation's military mission as well as by establishing goals and objectives to guide future management.

2.0 INSTALLATION PROFILE

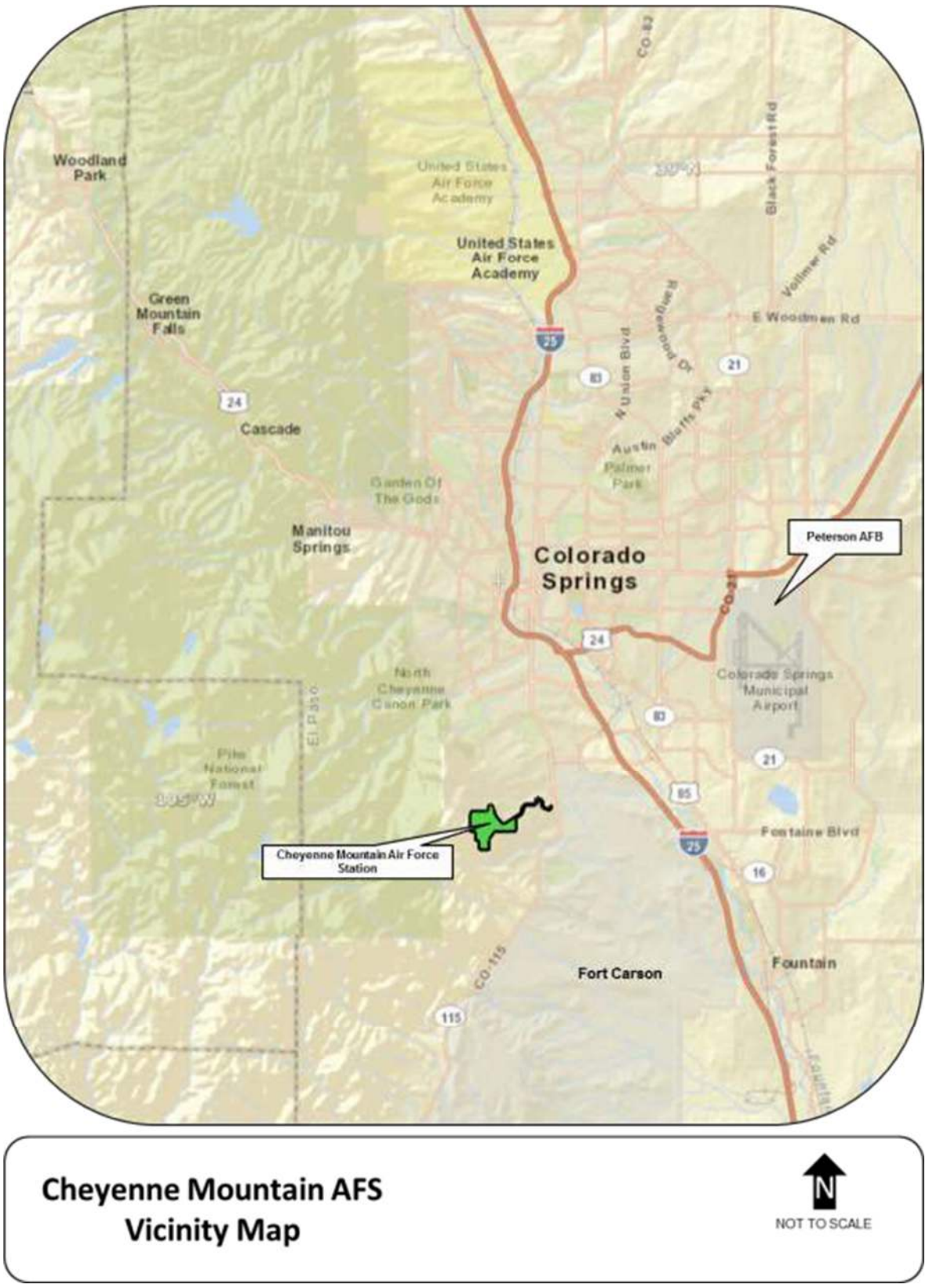
Office of Primary Responsibility	The Natural Resource Manager has overall responsibility for implementing the Natural Resources Management program and is the lead organization for monitoring compliance with applicable federal, state and local regulations
Natural Resources Manager/POC	Name: David Kelley Phone: (719) 556-1433 E-mail: david.kelley.25@us.af.mil
State and/or local regulatory POCs (For US-bases, include agency name for Sikes Act cooperating agencies)	Colorado Parks and Wildlife
Total acreage managed by installation	568
Total acreage of wetlands	0
Total acreage of forested land	480
Does installation have any Biological Opinions? (If yes, list title and date, and identify where they are maintained)	No
NR Program Applicability (Place a checkmark next to each program that must be implemented at the installation. Document applicability and current management practices in Section 7.0)	❒ Invasive species ☐ Wetlands Protection Program ❒ Grounds Maintenance Contract/SOW ❒ Forest Management Program ❒ Wildland Fire Management Program ☐ Agricultural Outleasing Program ❒ Integrated Pest Management Program ☐ Bird/Wildlife Aircraft Strike Hazard (BASH) Program ☐ Coastal Zones/Marine Resources Management Program ❒ Cultural Resources Management Program

2.1 Installation Overview

2.1.1 Location and Area

Cheyenne Mountain SFS is located in El Paso County, in south central Colorado. Downtown Colorado Springs is approximately seven miles (11 kilometers) north of the installation (Figure: Map of Cheyenne Mountain AFS and Vicinity). NORAD Road provides direct access to the installation from Colorado State Highway 115, a north/south highway on the west side of Colorado Springs. Cheyenne Mountain SFS is located near Pikes Peak, a famous landmark and tourist attraction in the area.

The installation encompasses approximately 568 acres (230 hectares) of government-owned land within its boundaries. Cheyenne Mountain SFS sits at about 7,000 feet (2,134 meters) above mean sea level (msl), approximately 900 feet higher than the city of Colorado Springs. The area surrounding the installation is relatively undeveloped except along the north central boundary which is occupied by a housing development. To the east, south, and southwest the installation is bordered by Cheyenne Mountain State Park. The remaining lands abutting the installation are private properties.



Map of Cheyenne Mountain AFS and Vicinity

Installation/GSU Location and Area Descriptions

Base/GSU Name	Main Use/Mission	Acreage	Addressed in INRMP?	Describe NR Implications
No GSUs	N/A	N/A	N/A	N/A

2.1.2 Installation History

Cheyenne Mountain AFS was planned and developed in response to the Soviet Union's ability to deliver nuclear weapons within the boundaries of the United States. The threat presented by Soviet nuclear weaponry grew as it produced nuclear arms of increasing reliability and destructive power; as aircraft, and then missiles, capable of delivering nuclear weapons were built by the Soviets; as launch platforms were developed; and as launch areas were established. During the Cold War era, the evolution of Cheyenne Mountain SFS kept pace with real and perceived advances in the Soviet ability to strike the United States with nuclear weapons. Planning and construction accelerated or was modified, for example, in response to Soviet development of high-performance, long-range jet bombers; thermonuclear weapons; intercontinental ballistic missiles (ICBM); submarine-launched ballistic missiles (SLBM); and the successful launch of Sputnik, which established that the Soviets had the capability to place a weapon in space that might be directed from orbit to the United States. With the end of the Cold War, such stimulus from the Soviets attenuated as the determiner of Cheyenne Mountain SFS operations and facilities. Since 11 September 2001, the threat of global terrorism has emerged as a force to which Cheyenne Mountain SFS continues to adapt. Key dates in the history of Cheyenne Mountain SFS follow:

- Planning for an underground combat operations center to provide command and control in support of the air defense mission against the Soviet manned bomber threat (i.e., what would become Cheyenne Mountain SFS) began in January 1956.
- The launch of Sputnik, the world's first man-made satellite, on 4 October 1957, demonstrated not only the accomplishments of the Soviet's space program, but also the capability to launch nuclear warheads from one continent to another.
- In the early 1960s, the advent of an ICBM attack against North America became a top priority. Missile warning and air sovereignty were the primary missions for Cheyenne Mountain SFS throughout the 1960s and 1970s. During a brief period in the mid-1970s, the Ballistic Missile Defense Center was operated within Cheyenne Mountain SFS.
- In 1979, the Air Force established a Space Defense Operations Center to counter the emerging Soviet anti-satellite threat. Although the space defense capabilities and systems established in Cheyenne Mountain were in their infancy, this marked the beginning of an increasing role in space.
- The evolution continued into the 1980s when Air Force Space Command (AFSPC) was created and tasked with the Air Force space mission. In April 1981, Space Defense Operations Center crews and their worldwide sensors, under the direction of Air Defense Command, supported the first flight of the space shuttle. Cheyenne Mountain SFS continued to support every shuttle mission until the program was discontinued in 2011.

- In the latter part of the 1980s, the air sovereignty mission received renewed emphasis, and it continues to play a role today in support of United States and Canadian Customs and Drug Enforcement Agencies. The Air Warning Center, through its air defense network, provides surveillance and control of air operations to North America.

- In the early 1990s, Desert Storm created the need to provide Theater Ballistic Missile Warning (TBMW) for deployed forces. The use of Defense Support Program (DSP) satellites to detect heat from missile and booster plumes provided warning to civilian populations and coalition forces in Israel and Saudi Arabia during the war.

- The lessons learned during the Gulf War highlighted the importance of being able to provide timely TBMW to deployed forces. Today, Cheyenne Mountain Directorate (CMD) has refined this process and is capable of detecting theater ballistic missiles and communicating those threats to the theater commander as soon as they emerge.

- On 11 September 2001, Cheyenne Mountain added another mission to its historic legacy in the defense of North America. The terrorist attacks against the United States marked the beginning of Operation Noble Eagle. Operation Noble Eagle is a homeland defense mission incorporating the North American Aerospace Defense Command (NORAD) mission of Aerospace Warning and Control to include the monitoring of the interior airspace of Canada and the United States. Today, NORAD and CMD stand ready to assist the Federal Aviation Administration and Navigation Canada in responding to any threatening or hostile domestic aircraft.

- 1 October 2002 marked the welcoming of two new commands, U.S. Northern Command (USNORTHCOM) and U.S. Strategic Command (USSTRATCOM), to Cheyenne Mountain. CMD is responsible for providing support to their respective missions of homeland defense and of space and missile warning, formerly associated with United States Space Command.

- On 20 December 2019, as part of the 2020 National Defense Authorization Act, Space Force was established as the sixth armed service branch.

Before the acquisition of Cheyenne Mountain SFS by the Air Force, the land was used for a variety of purposes. Parts of the Cheyenne Mountain SFS property, acquired from the JL Ranch, had been used for cattle grazing. The Star Ranch, north of Cheyenne Mountain SFS, was the location of a youth camp (Colorado Springs Gazette-Telegraph, 17-19 January 1950). The largest parcel, approximately 266 acres of Cheyenne Mountain SFS, was reportedly acquired from the estate of J. Robert Neal. A long-time, local resident recalled that the Neal family may have had a residence just north of the area now occupied by Cheyenne Mountain SFS, but he was unsure if the family ran any cattle on the property (personal communication between Stuart Dodge, Pikes Peak Chapter, Colorado Archaeological Society, and William Arbogast, 12 November 1990). In January 1950, the Cheyenne Mountain SFS area and large areas surrounding it were heavily burned by a major fire that covered much of the east slope of Cheyenne Mountain (Colorado Springs Gazette-Telegraph, 17-19 January 1950).

2.1.3 Military Missions

Cheyenne Mountain SFS is host to NORAD. It is the central collection and coordination center for a worldwide system of satellites, radars, and sensors that provide early warning of any missile, air, or space threat to North America. Supporting the NORAD mission, the CMD provides warning of ballistic missile or air attacks against North America, assists the air sovereignty mission for the United States and Canada, and, if necessary, serves as the focal point for air defense operations to counter enemy bombers or cruise missiles. In addition, CMD provides Theater Ballistic Missile Warning for United States and allied forces.

In support of USSTRATCOM, CMD provides a day-to-day picture of precisely what is in space and where it is located. Space control operations include protection, prevention, and negation functions supported by the surveillance of space.

Cheyenne Mountain Directorate is a joint and bi-national military organization comprised of more than 200 professionals from the Army, Navy, Marine Corps, Air Force, Space Force and Canadian Forces. Operations are conducted in seven centers:

- Air Warning Center (AWC): provides command and control of the air surveillance and defense network, using air- and ground-based radars inside and along the periphery of North America
- Joint Space Operations Center (JSPOC): conducts surveillance of and works to assure protection of United States assets in space
- Missile Correlation Center (MCC): provides warning of missile attacks launched against North America or United States forces overseas using a worldwide communications and sensor network
- CMD Command Center (CCC): fuses data from the other centers and passes it to the leadership of the United States and Canada, as well as regional command centers overseas
- Operational Intelligence Watch (OIW): gathers intelligence information assisting CMD in analyzing, validating, and correlating events, which supports NORAD, USNORTHCOM, and USSTRATCOM decision makers
- Systems Center: manages and controls missile warning, aerospace defense, and space surveillance communications and computer systems
- Weather Center: performs continuous meteorological monitoring of terrestrial, geophysical, and solar weather events that could affect U.S. space assets, NORAD, USNORTHCOM, and USSTRATCOM units, missions, and equipment

Cheyenne Mountain SFS has a total work force of about 800 individuals, with none residing on the installation.

Listing of Tenants and NR Responsibility

Tenant Organization	NR Responsibility
AF Technical Applications Center (AFTAC)	21 CES/CEIE
Defense Intelligence Agency (DIA)	21 CES/CEIE
Defense Energy Support Center	21 CES/CEIE
Army & AF Exchange Service (AAFES)	21 CES/CEIE
US Northern Command	21 CES/CEIE
MDA - Missile Defense Agency	21 CES/CEIE
Joint Functional Component Command for Space (JFCCSPACE)	21 CES/CEIE
North American Aerospace Defense Command (NORAD)	21 CES/CEIE

2.1.4 Surrounding Communities

Cheyenne Mountain Space Force Station is located just seven miles south of downtown Colorado Springs, which had an estimated population of 472,688 in 2018. The city has experienced significant growth since 1992. Other neighboring communities within a 10-mile radius include Manitou Springs and Fountain. El Paso County overall has grown to a population of more than 720,403 (U.S. Census Bureau 2019).

Three local Space Force Installations, collectively known as the "Peterson-Schriever Garrison," are present in the Colorado Springs area: Schriever Space Force Base (SFB), Peterson SFB, and Cheyenne Mountain SFS. These installations in addition to the U.S. Air Force Academy and Fort Carson, which are also present in the area, contribute significantly to the local economy.

Commercial broadcast antennas are located to the west atop the summit of Cheyenne Mountain, with a limited access road leading to the antenna farm area from the north-northeast. Fort Carson Army Post is located to the east across State Highway 115.

2.1.5 Local and Regional Natural Areas

Several natural areas exist in the vicinity of Cheyenne Mountain SFS. Cheyenne Mountain State Park is located directly adjacent to the installation along its eastern and southern boundaries. This park consists of approximately 1,680 acres (680 hectares) to the south-southeast of Cheyenne Mountain SFS, and its ecology is nearly identical to that of Cheyenne Mountain SFS. Pike National Forest is located 2.5 miles (4 kilometers) west of Cheyenne Mountain SFS. Bear Creek Regional Park and North Cheyenne Canyon Park are both located 6-7 miles (10-11 kilometers) northwest of Cheyenne Mountain SFS. These areas all have native plant communities similar to habitat present on Cheyenne Mountain SFS. The Fountain Creek Nature Center is located about 6-7 miles (10-11 kilometers) southeast of the installation. It is dissimilar to Cheyenne Mountain SFS due to the presence of extensive wetlands.

2.2 Physical Environment

2.2.1 Climate

The Colorado Springs area has a dry, continental climate characterized by hot summers and cold winters (Table: Colorado Springs Climate Conditions). During the winter months (December through February), the average temperature is 31ºF (-1ºC) and the average minimum temperature is 18ºF (-8ºC). In the summertime (June through August), the average daily temperature is 68ºF (20ºC) and the average maximum temperature is 82ºF (28ºC). The regional growing season is approximately 4.5 months long and extends from the average last freeze date in mid-May to the average first freeze date in late September.

Annual precipitation in the Colorado Springs area is approximately 16.6 inches (42 centimeters), most of which occurs as rainfall between April and September. Summer storms tend to be violent, isolated thunderstorms accompanied by hail, lightning, and high winds. The average snowfall is 42 inches (107 centimeters) per year. The average relative humidity is low and averages below 40% during daytime hours (11:00 AM to 5:00 PM). (Note that the above temperature and precipitation data are recorded at the Colorado Springs Airport, located on the open prairie approximately 10 miles [16 kilometers] northeast of Cheyenne Mountain SFS. Due to the distinct differences in terrain, aspect, habitat, and elevation, the climate at Cheyenne Mountain SFS will vary slightly from that of the airport.)

Colorado Springs Climate Conditions[1]

Month →	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Annual
Ave. max.temp. – F	43	45	52	60	69	79	85	82	74	63	51	42	62
Ave. min.temp – F	18	20	26	33	43	51	57	56	47	36	25	17	36
Ave. total precip. -- in.	0.31	0.35	0.98	1.42	2.05	2.52	2.83	3.35	1.18	0.83	0.39	0.35	16.56
Ave. total snow -- in.	6	5	8	5	1	0	0	0	0	3	5	6	39

[1]USClimateData.com 2014

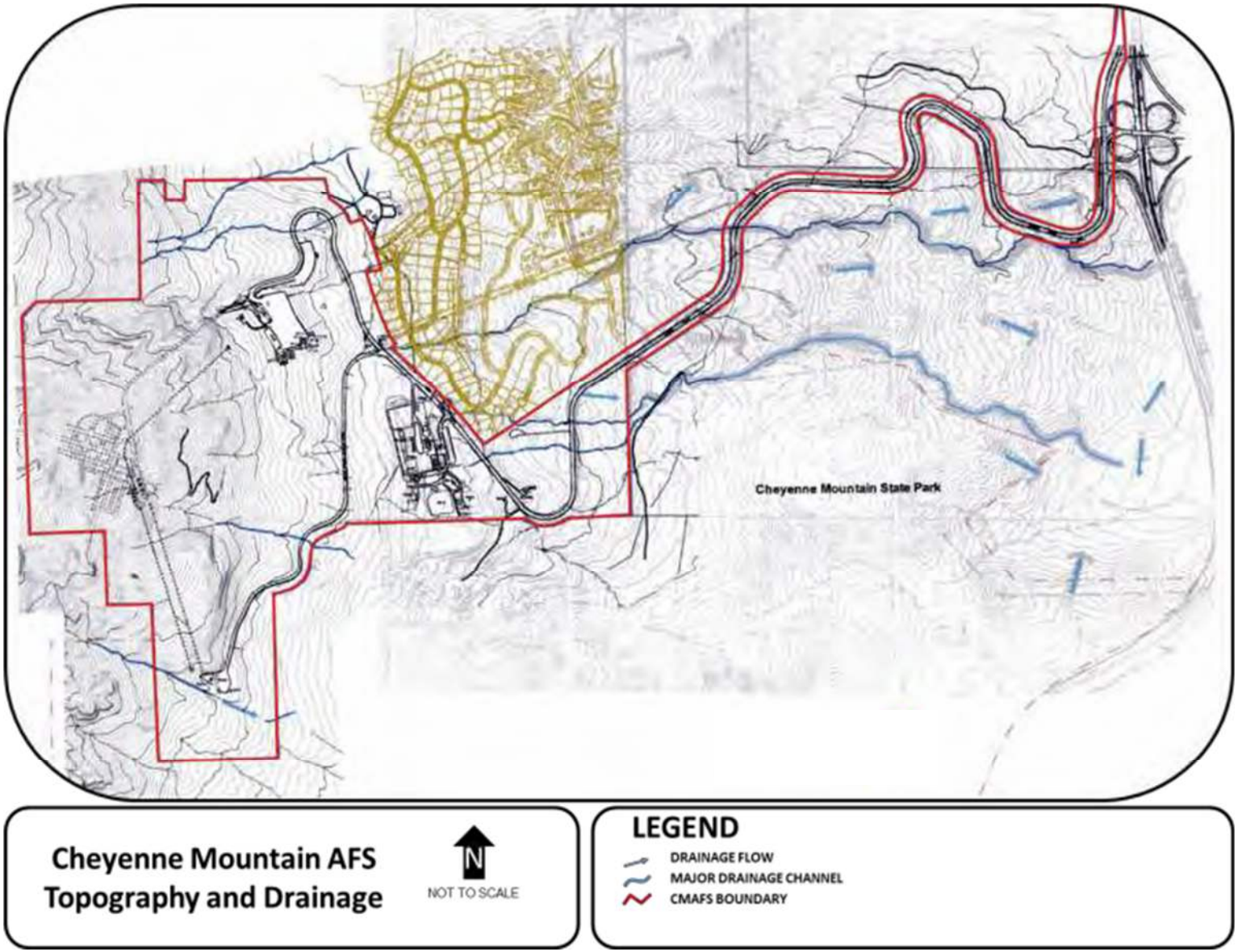
Prevailing winds in the Colorado Springs area are from the north at average speeds of 10 miles per hour (mph) (4 meters per second). At Cheyenne Mountain SFS, the prevailing wind direction is from the northwest and, during the late winter and early spring, strong winds from the west, called "Chinook Winds", occur and are sometimes measured at speeds exceeding 100 mph (161 kilometers per hour) (Cheyenne Mountain AFS, 2003).

Climate change is expected to influence the above temperature and precipitation regimes over time. In theory, the average temperatures will increase and the average precipitation will decrease. This may result in gradual changes to the habitats and, subsequently, the faunal communities of the area.

2.2.2 Landforms

Cheyenne Mountain SFS is situated on the eastern flank of Cheyenne Mountain, which is part of the Front Range of the southern Rocky Mountains (Figure: Topography and Drainage at Cheyenne Mountain AFS). The area to the east is semi-arid plains, and immediately to the west are mountains with elevations to 14,000 feet (4,267 meters). The principal topographic features include rocky cliff faces and steep ravines in the western half of the site and broad, alluvium-covered slopes in the remainder of the site. The elevation at Cheyenne Mountain SFS ranges from a maximum of approximately 9,020 feet (2,749 meters) MSL on the western side of the property to a minimum of 6,000 feet (1,829 meters) msl on the eastern side near Highway 115 at the access to NORAD Road. Most of the exterior facilities (e.g., the Building 100 area, Building 300 area, Helipad) are situated at elevations ranging from 6,820 to 6,700 feet (2,079 to 2,042 meters) msl.

Slopes on Cheyenne Mountain SFS vary from approximately 12% to 80%, depending on the elevation. In the western half of the site, where the elevation ranges from approximately 9,020 to 7,060 feet (2,749 to 2,152 meters) msl, the average slope is 80%. At an elevation of about 7,060 feet (2,749 meters) msl, the slope breaks to approximately 25% and is fairly consistent until an elevation of approximately 6,800 feet (2,073 meters) msl. At this elevation, the slope decreases to approximately 12% and is consistent to the eastern boundary of the site.



Topography and Drainage at Cheyenne Mountain AF

2.2.3 Geology and Soils

Cheyenne Mountain is located at the southern end of the Front Range of the southern Rocky Mountains, on the southeastern edge of the Pikes Peak massif. Geologically, Cheyenne Mountain SFS is on the southern margin of the Denver Basin. The Front Range is a faulted anticline range consisting of a core of Precambrian-aged (approximately 1 to 1.75 billion years old) igneous and metamorphic rocks that have been uplifted and eroded during two separate mountain building (orogenic) events. The most recent of these events, the Laramide Orogeny, occurred during the Tertiary Period (approximately 65 to 54 million years ago). Since that time, continued erosion has stripped away overlying sedimentary rocks and exposed the underlying core of granites, gneisses, and schists. At Cheyenne Mountain, this core consists primarily of the Pikes Peak Granite. Geologic units exposed in the area include rockfall deposits of Pleistocene-Yarmouth Interglaciation age, fan alluvium of Upper Holocene age, Verdos alluvium of Pleistocene-Yarmouth Interglaciation or Kansan Glaciation age, and granodiorite and quartz diorite of Precambrian age. Most of the east face of Cheyenne Mountain has been mapped as Boulder Creek granodiorite. Three other mapping units have been classified: Post-Piney Creek and Piney Creek Alluvium, Quaternary Landslide Deposits, and Quaternary Colluvium. Cheyenne Mountain is structurally bounded on the east by the Ute Pass Fault, which roughly trends north-south. At least two other faults are suspected to cross Cheyenne Mountain SFS in a north-south direction. None of these faults are considered to be active (Cheyenne Mountain AFS 2003). More detailed discussions of the geology of the Front Range, Cheyenne Mountain, and the Colorado Springs area are presented by Chronic (1980) and Kent and Porter (1980).

Four principal soil types are present at Cheyenne Mountain SFS. The western half of the site (down to an elevation of approximately 7,000 feet [2,134 meters] msl) is characterized by rock outcrops and soils from the Coldcreek (cobbly loam) and Tolman (gravely loam) series. The soil in the Building 300 area is a sandy arkosic loam from the Bresser series (likely underlain by the Post-Piney Creek and Piney Creek Alluvium). A small area on the eastern edge of the installation is a Razor stony clay loam. The remainder of the site is characterized by soils from the Jarre (gravely-sandy loam) and Tecolote (stony loam) series. Although geologic maps do not show it, some sedimentary rock, including limestone, was observed during field investigations conducted for the Cultural Resources Management Plan. Members of the Pikes Peak Chapter of the Colorado Archaeological Society also reported the existence of limestone outcrops in the area.

Coldcreek soils are deep and well-drained with moderate permeability, and they typically have a maximum rooting depth of 40 inches (102 centimeters) or more. Tolman soils are shallow and well-drained with moderate permeability, and they have an effective rooting depth of 10-20 inches (25-51 centimeters). Both are derived from weathered acidic igneous rock and exhibit medium surface runoff and moderate erosion hazard. Bresser soils are deep and well-drained with moderate permeability, formed in Arkosic alluvium and residuum with some clay, on terraces and uplands, and they have an effective rooting depth of 60 inches (152 centimeters) or more. This soil type also has medium surface runoff and moderate erosion hazard. Jarre soils are deep and well-drained with moderate permeability, derived from sandy sediments with surficial cobbles and stones, and an effective rooting depth of 60 inches (152 centimeters) or more. This soil is characterized by medium to rapid surface runoff and moderate to high erosion hazard. Tecolote soils are deep and well-drained, with moderate permeability, formed in alluvium from acidic igneous rock. The surface typically has 30% to 50% cobbles and stones, with an effective rooting depth of 40 inches (102 centimeters) or more. These soils have medium surface runoff and moderate erosion hazard. Razor soils are well-drained with medium surface runoff and moderate erosion hazard. Table: Soil Characteristics at Cheyenne Mountain SFS describes the soil characteristics at Cheyenne Mountain SFS.

Available soil maps do not differentiate between soils of the Coldcreek and Tolman series or Jarre and Tecolote series; however, they are distinct. The Soil Survey of El Paso Area, Colorado (U.S. Department of Agriculture 1981) presents more detailed information on soil characteristics, distribution, and potential uses. For construction purposes, the primary soil factors to consider are erodibility, permeability and high-water table, elasticity, shrink/swell potential, compactability, and bearing strength.

Soil Characteristics at Cheyenne Mountain SFS

Soil Series	Slope (%)	Texture	Infiltration Rating	Surface Runoff	Fire Damage Susceptibility	Limitations to Foundation Construction	Erosion Hazard Wind/Water
Coldcreek-Tolman	9-90	gravelly loam	Moderate-Very slow	High	Moderate	Very limited: depth to bedrock, slope, large stones	Moderate/Severe
Jarre-Tecolote	8-65	gravelly sandy loam	Moderate	Medium-High	Moderate	Very limited: slope, large stones	High/Moderate
Bresser	5-9	sandy loam	Moderate	Medium	Moderate	Somewhat limited: slope	High/Slight
Razor	5-15	stony clay loam	Slow	Medium	Moderate	Very limited: slope, shrink/swell, large stones	Moderate/Slight

SOURCE: Natural Resource Conservation Service (2013)

2.2.4 Hydrology

Seasonal runoff occurs along the upper portion of NORAD Road upslope from South Portal Road. Another area to the east (downslope) of the northern portion of South Portal Road, and west (upslope) of the Building 300 Compound and the overflow parking area/alternate helipad, has vegetation and moist soil indicative of a seep, but flowing water has not been observed. There are no surface water impoundments on Cheyenne Mountain SFS property. Further, none of Cheyenne Mountain SFS is located in a floodplain.

Surface drainage at Cheyenne Mountain SFS flows generally eastward along several unnamed, ephemeral stream channels (see Figure: Topography and Drainage at Cheyenne Mountain AFS). These seasonal flows form three intermittent drainages that lead off-site to the watershed of Fountain Creek (but not directly into Fountain Creek, which is located east of Fort Carson) and eventually to the Arkansas River. One of these drainages originates in a steep ravine adjacent to the North Portal. Flow typically does not occur in these streams during parts of the winter and dry months. Spring water discharged from the interior storm drainage system under a National Pollutant Discharge Elimination System (NPDES) permit evaporates or is absorbed into the soil, and it does not appear to exit installation property. The nearest permanent water is Rock Creek, approximately 2.5 miles (4 kilometers) to the south. Water diversion is accomplished through curbs and gutters, beaver slides, and parking lot diversion ponds

2.3 Ecosystems and the Biotic Environment

2.3.1 Ecosystem Classification

To implement ecosystem management at Cheyenne Mountain SFS, basic information about the nature and distribution of ecosystems is needed. Ecological units based on the physical and biotic environment provide a basis for natural resource planning and management. The flora and fauna of Cheyenne Mountain SFS is typical of the foothills or the Montane Zone (6,000-9,000 feet [1,829- 2,743 meters] msl) of the Front Range. Elevation and moisture availability drive the ecological processes and the distribution of species of the Front Range.

The Hierarchical Framework of Ecological Units is an established classification and mapping system that identifies land and water areas at different levels of resolution with similar capabilities and potentials for management. Depending on scale, ecological units are designed to exhibit similar patterns in potential natural communities, soils, hydrologic function, landform and topography, lithology, climate, and natural processes such as nutrient cycling, productivity, succession, and natural disturbance regimes associated with flooding, wind, or fire. Maps of these units may be used to delineate ecosystems, assess resources, conduct environmental analyses, and manage and monitor natural resources (Cleland et al. 1997).

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources (U.S. Environmental Protection Agency 2005). At this scale, ecological units are recognized by differences in global, continental, and regional climatic regimes and gross physiography (Cleland et al. 1997). Four levels of ecoregions, adapted from Bailey (1980), are identified in the hierarchy: domains, divisions, provinces, and sections. Ecoregional descriptions for Cheyenne Mountain SFS follow:

- The Dry Domain is characterized by annual losses of water through evaporation at the earth's surface exceeding annual water gains from precipitation. Included in this domain are desert, semidesert, steppe, shrub, open woodland, coniferous forest, and alpine meadow provinces. Vegetation varies extensively across this domain. Cheyenne Mountain SFS would further be classified as semiarid steppe, a transition between desert and humid climates.
- The Temperate Desert Division includes areas with low rainfall and strong temperature contrasts between summer and winter. In the intermountain region of the western United States between the Pacific coast and Rocky Mountains, the temperate desert has characteristics of a sagebrush (*Artemisia* spp.) semidesert ecosystem, with a very pronounced drought season and a short humid season. Most precipitation falls in winter, despite a peak in May. Aridity increases markedly in the rain shadow of the Pacific mountain ranges. Even at intermediate elevations, winters are long and cold, with temperatures falling below 32ºF (0ºC). Mountains exhibiting altitudinal zonation and the climatic regime of the adjacent lowlands are distinguished according to the character of zonation (see Province below).
- The Southern Rocky Mountain Steppe--Open Woodland--Coniferous Forest--Alpine Meadow Province is characterized by pronounced vegetational zonation, controlled by a combination of altitude, latitude, direction of prevailing winds, and slope exposure. Generally, the various zones are at higher altitudes in the southern part of the province than in the northern, and they extend downward on east facing and north facing slopes and in narrow ravines and valleys subject to cold air drainage. The uppermost (alpine) zone is characterized by alpine tundra and the absence of trees. Directly below it is the subalpine zone, dominated in most places by Engelmann spruce

(*Picea engelmannii*) and subalpine fir. Below this area lies the montane zone, characterized by ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*), which frequently alternate: ponderosa pine dominates on lower, drier, more exposed slopes, with Douglas-fir predominant in higher, moister, more sheltered areas.

Grass, often mixed with sagebrush, regularly covers the ground in open ponderosa pine forests and some treeless areas. Thesetreeless openings are usually small, and they often alternate (depending on slope exposure) with ponderosa pine forest. At the lower edge of the montane zone, they may open onto the adjacent grass and sagebrush belt.

Below the montane belt is the foothill (woodland) zone. Dry rocky slopes in this zone often have a growth of shrubs in which mountain-mahogany (*Cercocarpus montanus*) and several kinds of scrub oak (*Quercus* spp.) are conspicuous. Along the border of the Colorado Plateau Province, ponderosa pine and pinyon-juniper associations frequently alternate, depending on slope exposure. Unforested parks are a conspicuous feature of this province. Many are dominated by grasses, but some are covered largely by sagebrush and other shrubs, such as antelope bitterbrush (*Purshia tridentata*).

- At the section level, the Crystalline Mid-Elevation Forests are found mostly in the 7,000 to 9,000 feet (2,134 to 2,743 meters) elevation range on crystalline and metamorphic substrates. Most of the region occurs in the eastern half of the Southern Rockies. Natural vegetation includes aspen (*Populus* spp.), ponderosa pine, Douglas-fir, and areas of lodgepole pine (*Pinus contorta*) and limber pine (*Pinus flexilis*). A diverse understory of shrubs, grasses, and wildflowers occurs. The variety of food sources supports a diversity of bird and mammal species. Forest stands have become denser in many areas due to decades of fire suppression.

  Also at the section level, the Foothill Shrublands are a transition from the higher elevation forests to the drier and lower Great Plains to the east and to the Colorado Plateaus to the west. This semiarid region has rolling to irregular terrain of hills, ridges, and footslopes, with elevations generally 6,000 to 8,500 feet (1,829 to 2,591 meters). Sagebrush and mountain-mahogany (*Cercocarpus montanus*) shrubland, pinyon-juniper woodland, and scattered oak shrublands occur. Other common low shrubs include serviceberry (*Amelanchier* spp.) and skunkbush sumac (*Rhus trilobata*). Interspersed are some grasslands of blue grama (*Chondrosum gracile*), junegrass (*Koeleria macrantha*), and western wheatgrass (*Pascopyrum smithii*).

Ecoregions are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernment organizations that are responsible for different types of resources within the same geographical areas.

As indicated above, Cheyenne Mountain SFS occurs within a transition zone of two ecosystems—montane shrubland and montane forest. As described by Armstrong et al. (2011), montane shrubland is dominated by Gambel oak (*Quercus gambelii*), mountain-mahogany, and other shrubs with a grass understory of needle-and-thread grass (*Hesperostipa comata*), blue grama, and western wheatgrass. Montane shrublands are rich and diverse, supporting plants and animals more typical of adjacent ecosystems (Armstrong et al. 2011). Wildlife species typically associated with these shrublands include

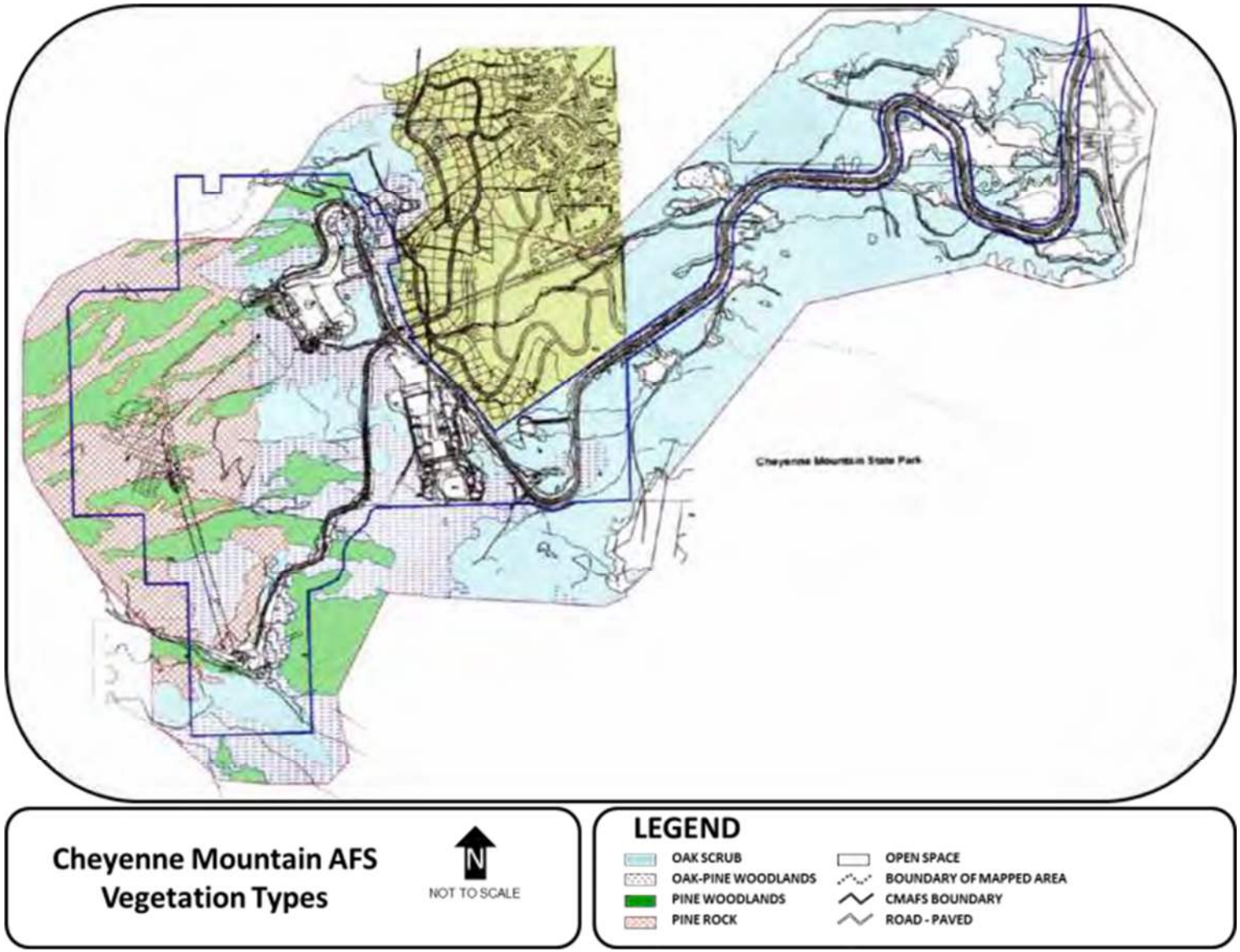
scrub jay (*Aphelocoma californica*), spotted towhee (*Pipilo maculatus*), Virginia's warbler (*Oreothlypis virginiae*), gray fox (*Urocyon cinereoargenteus*), and mule deer (*Odocoileus hemionus*) (Mutel and Emerick 1992). Montane forest is dominated by ponderosa pine, Douglas-fir, and other conifers with an understory of current (*Ribes* spp.), Arizona fescue (*Festuca arizonica*), kinnikinnik (*Arctostaphylos uva-ursi*), and mountain maple (*Acer glabrum*). Typical wildlife in this community includes western bluebird (*Sialia mexicana*), Steller's jay (*Cyanocitta stelleri*), pygmy nuthatch (*Sitta pygmaea*), and Abert's squirrel (*Sciurus aberti*) (Mutel and Emerick 1992).

2.3.2 Vegetation

Vegetation associations are classified by dominant species in the area. Defining habitats is necessary to assess the potential presence of wildlife, invasive species, and threatened and endangered and other sensitive species. In turn, these evaluations make it possible to identify areas that require conservation or management attention.

2.3.2.1 Historic Vegetative Cover

Cheyenne Mountain SFS is characterized by two distinct native plant communities, oak scrub and pine woodlands, and two transitional communities. Distribution of the four native plant communities is controlled by soil depth, aspect, soil moisture, elevation, and topography. All information presented in this section is taken from the Forest Management Plan (Engineering & Environment, Inc. 2005a).



Vegetative Types on Cheyenne Mountain AFS

Oak Scrub

The oak scrub community is most common at elevations below 6,750 feet (2,057 meters) msl and represents a traditional zone between grassland and montane communities (Figure: Vegetative Types on Cheyenne Mountain AFS). The predominant species is Gambel oak. Other species observed in this community include ponderosa pine, mountain-mahogany, bitterbrush, skunkbrush (*Rhus aromatica* sub. *trilobata*), Arizona fescue, and blue grama. In the wetter locations, such as canyon bottoms, occasional willows (*Salix* spp.) and plains cottonwoods (*Populus sargentii*) have been observed. The following table includes a list of the most common species occurring in the oak scrub community. At Cheyenne Mountain SFS, the Gambel oak is shrub-like in form, averages in height from 6-10 feet (2-3 meters), and typically grows in dense thickets. The density of grasses varies inversely with the density of the scrub oak, ranging from moderately abundant to nonexistent. This community represents a relatively high risk for wildland fire as the oak thickets provide connectivity to conifer tree crowns, creating conditions whereby crown fires could occur were a fire to ignite.

Common Plant Species in Oak Scrub Communities

TREES/SHRUBS	
Common Name	**Scientific Name**
Chokecherry	*Padus virginiana*
Gambel Oak	*Quercus gambelii*
Hawthorn	*Crataegus* spp.
Mountain-mahogany	*Cercocarpus montanus*
Plains Cottonwood	*Populus sargentii*
Ponderosa Pine	*Pinus ponderosa*
Western Serviceberry	*Amelanchier alnifolia*
LOW GROWING SHRUBS	
Common Name	**Scientific Name**
Bitterbrush	*Purshia tridentata*
Rabbitbrush	*Chrysothamnus viscidiflorus*
Skunkbrush	*Rhus aromatica*
Wild Rose	*Rosa woodsii*
GRASSESS	
Common Name	**Scientific Name**
Arizona Fescue	*Festuca arizonica*
Blue Grama	*Chondrosum gracile*
Mountain Muhly	*Muhlenbergia montana*

SOURCE: Cheyenne Mountain AFB (1993)

Pine Woodlands

The pine woodlands community exists predominantly at elevations above 6,750 feet (2,057 meters) msl in areas where the depth of soil to bedrock is adequate to support vegetation (Figure: Vegetative Types on Cheyenne Mountain AFS). Trees found in this community include ponderosa pine, Douglas-fir, white fir (*Abies concolor*), blue spruce (*Picea pungens*), and Rocky Mountain juniper (*Juniperus communis*). At elevations between 6,750 and 7,500 feet (2,057 and 2,286 meters) msl, the predominant species is the ponderosa pine; above 7,500 feet (2,286 meters) msl, Douglas-fir and white fir are dominant. Other plants associated with this community include mountain muhly (*Muhlenbergia montana*), cinquefoil (*Potentilla* spp.), Arizona fescue, Kentucky bluegrass (*Poa pratensis*), and golden ragwort (*Packera fendleri*). Table:

Common Plant Species in Pine Woodlands lists the most common species occurring in the pine woodlands community.

Due to the absence of timber harvest activities and the suppression of forest fires over the past 50 years, the overstory structure of pine woodlands on Cheyenne Mountain SFS can be characterized as multi-aged. Mature sawtimber-sized trees (larger than 9 inches [0.23 meters] diameter breast height) are present in the co-dominant and understory sizes along with a variety of miscellaneous tree and shrub species. The existing structure to the vegetation creates high canopy connectivity between the various canopy layers. This connectivity serves as "ladder fuels," whereby a surface fire could easily be transmitted to the canopies of the trees were one to occur. Snags and downed woody materials are present but at undetermined densities.

Common Plant Species in Pine Woodlands

TREES	
Common Name	**Scientific Name**
Blue Spruce	*Picea pungens*
Douglas-fir	*Pseudotsuga menziesii*
Narrowleaf Cottonwood	*Populus angustifolia*
Plains Cottonwood	*Populus sargentii*
Ponderosa Pine	*Pinus ponderosa*
Rocky Mountain Juniper	*Juniperus communis*
White Fir	*Abies concolor*
FORBS	
Common Name	**Scientific Name**
Cinquefoil	*Potentilla* spp.
Common Harebell	*Campanula rotundifolia*
Geranium	*Geranium caespitosum*
Golden Ragwort	*Packera fendleri*
Locoweed	*Oxytropis lambertii*
Milk Vetch	*Astragalus agrestis*
Yarrow	*Achillea lanulosa*
GRASSESS	
Common Name	**Scientific Name**
Arizona Fescue	*Festuca arizonica*
Kentucky Bluegrass	*Poa pratensis*
Mountain Muhly	*Muhlenbergia montana*

SOURCE: Cheyenne Mountain AFS (1993)

Oak-Pine Woodlands

The oak-pine woodlands community is situated primarily between elevations of 6,625 and 7,375 feet (2,019-2,248 meters) msl. Oak-pine woodlands, a transitional community, consist of primarily ponderosa pine (but other conifers are present) with Gambel oak interspersed throughout the understory. The difference between this community and the oak scrub community is the density ratio of conifer trees to Gambel oak. As with the oak scrub community, this community represents a relatively high risk for wildland fire as the oak thickets and the connectivity between tree crowns could create conditions whereby crown fires could occur were a fire to ignite.

Pine-Rock (Mixed Conifer-Rock)

The pine-rock (mixed conifer-rock) community is an extension of the pine woodlands community into areas of shallow-to-nonexistent soil cover. This community is located primarily in areas of exposed bedrock at elevations above 7,500 feet (2,286 meters) msl (i.e., highly inaccessible areas on the western third of Cheyenne Mountain SFS). Slopes can be in excess of 80%. Native vegetation consists of scattered individuals and small stands of coniferous trees, primarily Douglas-fir, ponderosa pine, and white fir, as well as some Gambel oak. Vegetation cover ranges from 0-60% throughout this community. Detailed surveys on both structure and health of this community have not been conducted to date.

2.3.2.2 Current Vegetative Cover

The four native plant communities currently cover approximately 480 acres (194 hectares) or 85% of Cheyenne Mountain SFS; the remaining 15% of the site represents improved areas and includes man-made structures, roads, parking lots, and lawns, and is shown as open space in Figure: Current Land Use on Cheyenne Mountains SFS. The breakdown of current vegetative cover on installation by type is shown in Table: Native Plant Community Distribution.

Native Plant Community Distribution

Vegetation Type	Acres (Hectares)	Percentage of Installation Cover
Oak Scrub	122 (49)	25
Pine Woodland	107 (43)	22
Oak-Pine Woodland	134 (54)	29
Pine-Rock (Mixed Conifer)	117 (47)	24
Total Vegetative Cover	**480 (194)**	**100**

Biodiversity inventories, during which vegetative species and communities were documented, were conducted in 1995 and again in 2017-2018. See Appendix B for a comprehensive list of plants recorded on Cheyenne Mountain SFS.

2.3.2.3 Turf and Landscaped Areas

Nearly 20 acres (8 hectares), of installation lands (including 4 acres [1.6 hectares] of irrigated lands), are improved grounds, occupied by administrative, industrial, and recreation areas. These developed areas are planted with grasses, shrubs, and trees for aesthetic reasons and for erosion control. Present vegetative cover on improved grounds includes Kentucky bluegrass, crested wheatgrass (*Agropyron cristatum*), and western wheatgrass. Historically, a variety of trees have also been planted throughout the cantonment area.

2.3.3 Fish and Wildlife

Wildlife present at Cheyenne Mountain SFS includes species that are typical of the foothills area of the Front Range. Biodiversity inventories conducted in 1995 (Duwaldt et al. 1995), 2017-2018 (Sovell and Doyle, *in prep.*), and a baseline survey of avifauna (Engineering & Environment, Inc. 2005b) identified a number of species that have been observed at the sites discussed in the following paragraphs. See Appendix

C for a comprehensive list of animals documented on Cheyenne Mountain SFS.

Amphibians and Reptiles

Lacking wetlands, Cheyenne Mountain SFS is depauperate relative to amphibians, and the diversity of reptile species is low. No amphibians have been recorded to date, and only three reptiles have been documented: the prairie lizard (*Sceloporus undulatus*), the western terrestrial garter snake (*Thamnophis elegans*), and the western rattlesnake (*Crotalus viridis*). Some other species, such as the bull snake (*Pituophis catenifer*) are likely to be found in lower elevations on occasion, but are probably not numerous.

Mammals

Mammals commonly seen at Cheyenne Mountain SFS include mule deer (*Odocoileus hemionus*) , black bear (*Ursus americanus*), and a variety of small mammals such as raccoons (*Procyon lotor*), fox squirrels (*Sciurus niger*), Abert's squirrels (*Sciurus aberti*), red squirrels (*Tamiasciurus hudsonicus*), and striped skunks (*Mephitis mephitis*) (Cheyenne Mountain AS 1995). No studies of the mule deer population at Cheyenne Mountain SFS have been conducted; however, observations made by Kufeld et al. (1989) regarding mule deer that inhabit a similar setting approximately 140 miles (225 kilometers) north of Cheyenne Mountain SFS probably apply to local herds. According to Kufeld et al. (1989), mule deer living in the Front Range area are resident throughout the year and do not make seasonal migrations to higher or lower elevations. Home ranges are relatively small, from about 290-800 acres (117-324 hectares), because of habitat conditions and abundant food supplies. According to state wildlife biologists, most deer move in a north-south direction along the Front Range; relatively few deer move west over the mountains (Cheyenne Mountain AFB 1991). A small colony of black-tailed prairie dogs (*Cynomys ludovicianus*), a state species of concern, occurs near the Cheyenne Mountain SFS entrance and extends onto the right-of way from surrounding property.

Less conspicuous mammals observed at Cheyenne Mountain SFS include coyotes (*Canis latrans*), red foxes (*Vulpes vulpes*), gray foxes (*Urocyon cinereoargenteus*), bobcats (*Lynx rufus*), and mountain lions (*Puma concolor*).

Birds

A preliminary baseline survey of avifauna present on Cheyenne Mountain SFS was conducted in August 2005 (Engineering & Environment, Inc. 2005b). None of the thirty-nine species documented were federally or state listed as threatened or endangered, although the majority are protected under the Migratory Bird Treaty Act (MBTA). Most observed species are common residents of the habitat associations that are present on Cheyenne Mountain SFS. Rufous hummingbirds (*Selasphorus rufus*), mountain chickadees (*Poecile gambeli*), and Steller's jays were among the most commonly encountered species on the installation. Some individuals that were detected during this survey were likely early fall migrants and not necessarily resident breeders. The most notable find during this survey was the discovery of a nesting pair of golden eagles (*Aquila chrysaetos*) observed on a cliff face in the northernmost canyon on Cheyenne Mountain SFS at approximately 8,000 feet (2,438 meters). Both adults were observed visiting the nest, and at least one eaglet was heard begging for food. Golden eagles are protected under both the MBTA and the Bald and Golden Eagle Protection Act. At Cheyenne Mountain SFS, wild turkeys (*Meleagris gallopavo*) are common in groups of approximately 10-15 birds, although groups as large as 30-40 birds have been observed. The Gambel oak/ponderosa pine habitat is well suited to turkeys (Hoffman 1962). According to state wildlife biologists, turkeys in the area are rather mobile and may move as far as 3-5 miles (5-8 kilometers) per day or 30-40 miles (48-64 kilometers) over longer periods (Cheyenne Mountain AFB 1991).

2.3.4 Threatened and Endangered Species and Species of Concern

The Endangered Species Act (ESA) of 1973 (P.L. 93-205) protects fish, wildlife, and plants that are federally designated as threatened or endangered. Endangered and threatened species may be in jeopardy due to destruction, modification, or curtailment of habitat, development, or the effects of disease, pollution, or predation.

The Information for Planning and Construction (IPaC) resource list, accessible from within the USFWS Colorado Ecological Services Field Office website (https://ecos.fws.gov/ipac/location/index), lists the following floral and faunal species and critical habitat as trust resources, (those species that are Endangered, Threatened, Candidate, or Proposed for listing under the Endangered Species Act, and habitats critical to the survival of such species), in El Paso County:

Species	Scientific Name	Federal Listing
Mammals		
North American Wolverine	*Gulo gulo luscus*	Proposed Threatened
Birds		
Least Tern	*Sterna antillarum*	Endangered
Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened
Piping Plover	*Charadrius melodus*	Threatened
Whooping Crane	*Grus americana*	Endangered
Fishes		
Greenback Cutthroat Trout	*Oncorhynchus clarkii stomias*	Threatened
Pallid Sturgeon	*Scaphirhynchus albus*	Endangered
Flowering Plants		
Ute Ladies'-tresses	*Spiranthes diluvialis*	Threatened
Western Prairie Fringed Orchid	*Platanthera praeclara*	Threatened

Furthermore, the IPaC listing indicates that critical habitat for the Mexican spotted owl may be found in the vicinity of Cheyenne Mountain SFS.

The Sikes Act (16 USC 670a-670o, as amended) requires all military reservations with adequate natural resources to consider federally listed threatened and endangered floral and faunal species and critical

habitats if they may be found on the installations. Of those species listed, Cheyenne Mountain SFS has marginal habitat for Mexican spotted owl, but none of the other listed IPaC species. The Mexican Spotted Owl Recovery Plan (Mexican Spotted Owl Recovery Team 2012) provides criteria for the determination of critical habitat, and Cheyenne Mountain SFS lacks key elements to be considered for this designation. Furthermore, the Federal Register designating Mexican spotted owl critical habitat (69 FR 53181) states "….and military lands (Cheyenne Mountain Operations Center [now Cheyenne Mountain SFS]) are not designated as critical habitat."

In 2005 the Colorado Division of Wildlife (now CPW) developed the Colorado's Comprehensive Wildlife Conservation Strategy (Colorado Division of Wildlife 2005) in response to a national funding opportunity provided to states that develop such plans. This conservation strategy identifies Colorado wildlife species that are of greatest conservation need, as determined primarily by federal and state listing status, and inclusion in the Colorado Natural Heritage Program global and state ranking systems. The conservation strategy also addresses habitat types and relates wildlife species to those habitats. In 2015 CPW revised its conservation strategy and refined its categorization scheme of Colorado's wildlife species determined to be Species of Greatest Conservation Need (SGCN). These species are assigned to one of two tiers: Tier 1 species are of greatest conservation concern while Tier 2 species are, while still in need of monitoring, of somewhat less concern. Only one Tier 1 species, the golden eagle, has been documented on Cheyenne Mountain SFS, while four Tier 2 bird species have been observed: American peregrine falcon (*Falco peregrinus*), prairie falcon (*Falco mexicanus*), lazuli bunting (*Passerina amoena*), and Virginia's warbler (Colorado Parks and Wildlife 2015).

Title 33 of the Colorado State Statutes (C.R.S. Ann. §§ 33-2-102-106) identifies the state's intent to protect endangered, threatened, or rare species. The CPW maintains a list of animal species that are threatened or endangered in the state. In addition, the state recognizes species of special concern that potentially warrant state protection. Several of these species have suitable habitat present or potentially present at Cheyenne Mountain SFS; however, of these species, only the peregrine falcon and the black-tailed prairie dog have been identified to date on the installation. The peregrine falcon was once on the federal endangered species list, but was removed in 1999 due to recovery programs and subsequent increasing numbers. In 2014 peregrine falcons were observed on cliff faces near the north and south portal areas, and the presence of juveniles flying overhead in late summer indicated there was an active eyrie in the area. In 2015 and 2016 the peregrines were observed nesting on the cliff faces in the south portal area, fledging two young each year. The falcons were observed again in 2017, this time with at least one juvenile. In 2018 the peregrines fledged three juveniles: one female and two males. In 2019 and 2020, the pair fledged a single juvenile.

Concerning reptiles and amphibians, a Strategic Plan for Amphibian and Reptile Conservation and Management on Department of Defense Lands (Lovich et al. 2015) cites statistics indicating significant declines in herpetofaunal populations across the nation, and provides a listing of 24 federally threatened and endangered reptile and amphibian species found on DoD lands. Furthermore, Petersen et al. (2015) indicates that out of 336 confirmed herptile species found on Air Force installations, 6 federally endangered, 10 threatened, and 3 candidate species are documented on Air Force bases. However, herptile species expected to be found on Cheyenne Mountain SFS are neither state- nor federally listed as threatened, endangered or otherwise species of concern.

In 1994, a biodiversity study was conducted to establish a baseline inventory for rare, threatened, and endangered flora and fauna at Cheyenne Mountain SFS, focusing on their presence, status, and habitat locations (Cheyenne Mountain AFS 1995). The biodiversity study consisted of a literature search followed by field surveys during the fall and winter of 1994. Field surveys for rare plants consisted of foot surveys of all major vegetation types, with emphasis on areas of high soil moisture and humidity, including drainage

channels and beneath the conifer forest canopy. Ravines with seasonal runoff were surveyed because of their potential habitat for mesic and hydric species having limited distribution on the eastern slope of the Front Range. Rock outcrops also were surveyed for the presence of rare species. Animal surveys were conducted using standard techniques. Small mammals were surveyed using live traps and pitfall traps for shrews along transect lines in two main locations at Cheyenne Mountain SFS, which are considered to be representative of the major plant communities. Spotting scope surveys were used to locate nesting/roosting raptors. Walkover surveys were conducted to determine the presence of reptiles, amphibians, and larger mammals. Although this survey is dated, the environment has not changed significantly and the study is still thought to be valid. Detailed information from the biodiversity study is included in the following sections, as appropriate. Biodiversity inventories are again being conducted in 2017 and 2018, these results are under review and will be included at the next annual review.

In 2005, the preliminary baseline survey of avifauna focused on detecting Mexican spotted owls and habitat at Cheyenne Mountain SFS (Engineering & Environment, Inc. 2005b). It should be noted, however, that complete Mexican spotted owl inventories, as described in the USFWS Survey Protocols (Mexican Spotted Owl Survey Protocols Appendix), were not followed. Complete inventories would consist of four surveys conducted from late March through late June for each of two consecutive years. Conducted in mid-August, the 2005 field survey methods included unlimited distance point count sampling, general area searches (focused on canyons), and nocturnal owl call solicitation surveys. Distance point count sampling transects and owl call solicitation locations were verified with GPS in order to obtain WGS 84 latitude and longitude coordinates. Attempts were made to cover each habitat type in proportion to its occurrence on Cheyenne Mountain SFS, with the exception of Mexican spotted owl surveys. Mexican spotted owl surveys were conducted again in 2017 in the canyon that terminates near the North Portal. This canyon has what is considered the only potential spotted owl habitat on the installation. Owl calls were transmitted from three locations along the canyon, but they elicited no response from resident owls.

The Colorado Natural Heritage Program (CNHP), the state's primary repository of information describing biological diversity, publishes lists of rare and imperiled animals, plants, and natural communities (see *https://cnhp.colostate.edu/ourdata/trackinglist/*). These lists include species protected by state listing and, as appropriate, federal listing, as well as species determined by the CNHP to be critically imperiled. The CNHP ranks species in terms of relative degree of imperilment primarily on the basis of number of occurrences but also on the size of geographic range, number of individuals, population trends, distribution, identified threats, and the number of already protected occurrences. Listing and ranking of a species by the CNHP does not affect or determine its protected status; however, it does give an indication of biological diversity issues that may be of importance at Cheyenne Mountain SFS. Mammal and plant species listed by CNHP potentially occurring on Cheyenne Mountain SFS are provided in Table: Rare and Sensitive Species in the Vicinity of Cheyenne Mountain SFS.

While the MBTA protects most migratory birds, the USFWS Birds of Conservation Concern (BCC) list is intended to identify species, subspecies, or populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA, as well as represent the highest conservation priorities for migratory and non-migratory species (USFWS 2008). Species identified to date at Cheyenne Mountain SFS from the USFWS Region 6 BCC 2008 List include the golden eagle and prairie falcon. In 2006, a Memorandum of Understanding (MOU) was signed by DoD and the USFWS to promote the conservation of migratory birds in response to Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. The MOU serves as a vehicle by which the DoD and the USFWS may work collaboratively on bird conservation issues and actions, including bird inventories and monitoring, invasive species management, and bird habitat protection.

In addition, Priority Species have been identified by the nonprofit Partners in Flight (PIF) by Avifaunal Biomes and Bird Conservation Regions. The PIF Land Bird Conservation Plan for Colorado identifies priority species, conservation opportunities, and implementation strategies (Rich et al. 2004). Note that the 2005 version of the PIF Plan includes rankings both on the continental scale as well as Bird Conservation Region scale. Therefore, while band-tailed pigeons are included as "Watch List Species" in the Plan's Table 1 – PIF Species of Continental Importance for the U.S. and Canada, they are not included in Table 5 – Species of Continental Importance in the Intermountain West Avifaunal Biome.

Finally, during the past several years, a significant decline has been detected in pollinator populations around the globe (National Research Council 2007, The White House 2015, U.S. Department of Agriculture and U.S. Department of Interior 2015). Pollinators, such as bees, butterflies and moths, and some bats and birds, are essential for the sustainment of native and agricultural fruit, nut, and vegetable plants worldwide. They pollinate 80% of wild flowering plants in temperate latitudes, and support an estimated 18.3 billion dollar crop industry in the United States alone (U.S. Department of Agriculture and U.S. Department of Interior 2015). In 2014 the President issued a Presidential Memorandum, "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators" (The White House 2014), calling for the establishment of a Pollinator Task Force consisting of the heads of several federal agencies and organizations to address and reverse pollinator population declines. Furthermore, the DoD signed a Memorandum of Understanding with Pollinator Partnership, a nonprofit organization committed to the restoration of pollinator populations and the environments they reside in (see http://www.pollinator.org/). This memorandum outlines measures that the DoD and Pollinator Partnership, respectively, will adopt to promote the conservation and management of pollinators, their habitats and associated ecosystems. No comprehensive inventories for pollinators have been conducted on Cheyenne Mountain SFS.

See the following table for an overview of sensitive species potentially found on Cheyenne Mountain SFS.

Sensitive Species Potentially Found on Cheyenne Mountain SFS

		Federal/ State Status	USFWS BCC[1]	PIF[2]	CNHP rank[3]	Recorded on site
Plants						
Front Range Milkvetch	*Astragalus sparsiflorus*				G2/S2	X
Golden Columbine	*Aquilegia chrysantha* var. *rydbergii*				G4T1Q/S1	X
James' Telesonix	*Telesonix jamesii*	T2			G2G3/S2	
New Mexico Cliff Fern	*Woodsia neomexicana*				G4?/S2	X
Birds						
American Peregrine Falcon	*Falco peregrinus*	SC,T2	X		G4T4/S2B	X
Flammulated Owl	*Otus flammeolus*		X	X		
Golden Eagle	*Aquila chrysaetos*	T1	X			X
Lazuli Bunting	*Passerina amoena*	T2				X
Mexican Spotted Owl	*Strix occidentalis lucida*	FT/ST,T2			G3G4T3T4/ S1B,SUN	
Ovenbird	*Seiurus aurocapillus*				G5/S2B	X
Prairie Falcon	*Falco mexicanus*	T2	X		G5/S4B,S4N	X
Rufous Hummingbird	*Selasphorus rufus*	T2		X		X

Virginia's Warbler	*Oreothlypis virginiae*	T2		X		X
Mammals						
Big Free-tailed Bat	*Nyctinomops macrotis*	T2			G5/S1	
Black-tailed Prairie Dog	*Cynomys ludovicianus*	SC,T2			G4/S3	X
Botta's Pocket Gopher	*Thomomys bottae rubidus*	SC,T2			G5T1/S1	
Dwarf Shrew	*Sorex nanus*	T2			G4/S2	Poss. coll. in '95
Fringed Myotis	*Myotis thysanodes*	T1			G4/S3	
Hoary Bat	*Lasiurus cinereus*	T2			G3G4/S3S4B	
Townsend's Big-eared Bat	*Corynorhinus townsendii*	SC,T1			G3G4T3T4/S2	
Insects						
Hops Feeding Azure	*Celastrina humulus*	T2			G2G3/S2	
Lusk's Pinemoth	*Coloradia luski*	T2			G4/S1?	
Moss's Elfin	*Callophrys mossii schryveri*	T2			G4T4/S2S3	

[1]USFWS Birds of Conservation Concern

[2]Partners in Flight

[3]Colorado Natural Heritage Program rank. The CNHP ranking system is too extensive to list here. To review the ranking system, visit *https://cnhp.colostate.edu/ourdata/help/heritage/*.

FE = Federally Endangered; FT = Federally Threatened; SE = State Endangered; ST = State Threatened; SC = State Special Concern; T1 = State Tier 1 Species of Greatest Conservation Need (SGCN); T2 = Tier 2 SGCN

2.3.5 Wetlands and Floodplains

According to the USFWS National Wetlands Inventory (NWI), and as determined by aerial photo interpretation, there are currently no wetlands on Cheyenne Mountain SFS (*see* USFWS National Wetlands Inventory Map for Cheyenne Mountain SFS Appendix). The USFWS's definition of wetlands is different than that of the U.S. Army Corps of Engineers (USACE), and carries with it different implications. While the NWI's determination of wetlands is based on biological parameters, the USACE's determination includes whether or not those wetlands may be jurisdictional or nonjurisdictional (i.e. joined with waters of the U.S.), and is valid for a period of five years. The USACE has not made a wetlands determination on Cheyenne Mountain SFS within the past five years.

There are no known floodplain delineations on Cheyenne Mountain SFS. Research into the existence of floodplain delineations will be undertaken.

2.3.6 Other Natural Resource Information

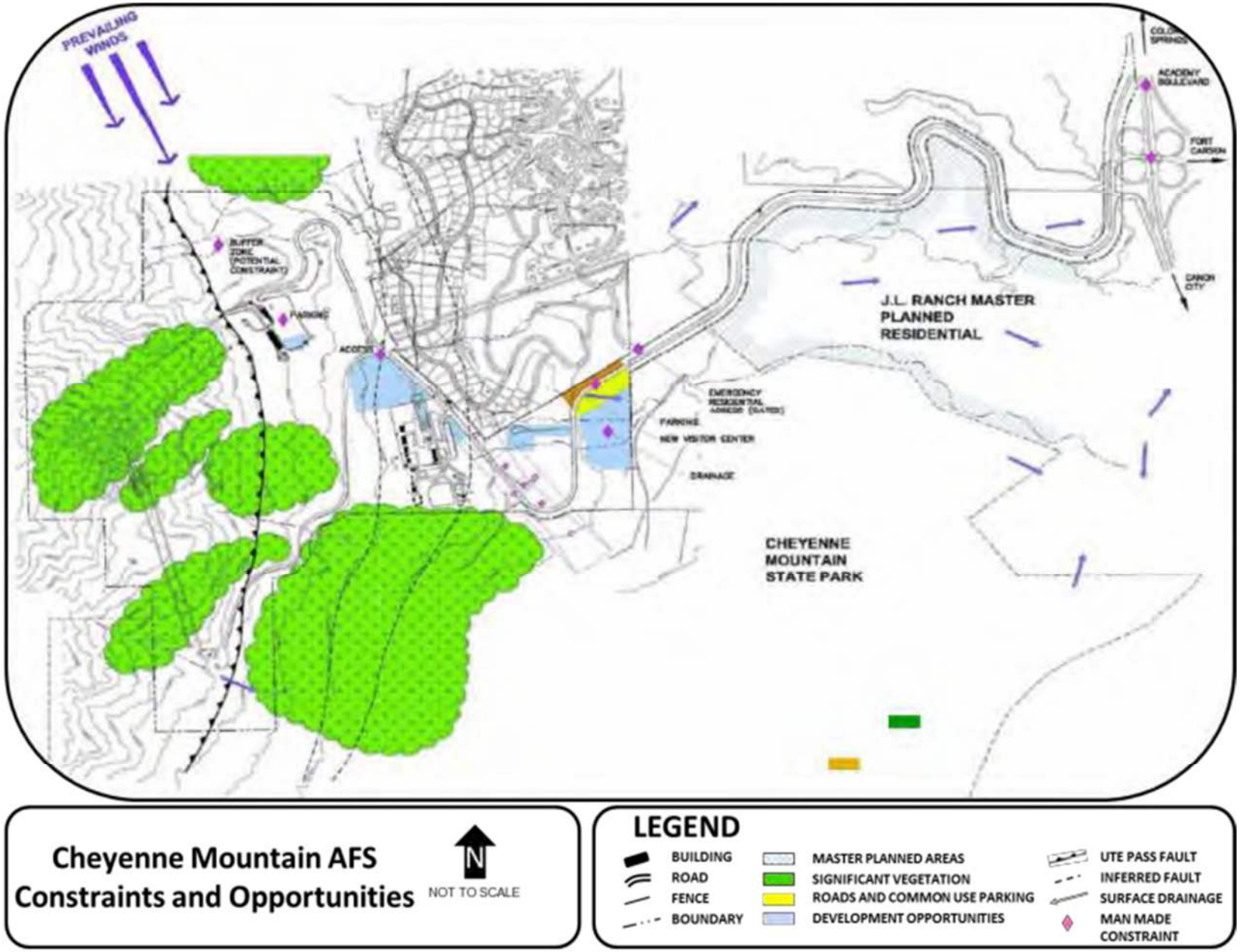
All other information and data pertinent to natural resources management on Cheyenne Mountain SFS are outlined and described in the sections of this INRMP respective of their topical areas.

2.4 Mission Impacts on Natural Resources

2.4.1 Natural Resource Constraints to Mission and Mission Planning

Natural resource constraints to mission planning refer to a lack of compatibility between inherent resource characteristics and the military mission. Identification of these constraints and the management issues they address is necessary to effectively manage natural resources. Natural resource constraints are considered in all planning activities and are incorporated in future planning and mission decisions. Land use decisions will be guided by the presence or absence of certain natural features such as the physical characteristics of soils, extreme slopes, and wildland fire threats. Potential natural resource constraints are illustrated in Figure: Constraints and Opportunities.

In large part due to the extreme terrain upon which Cheyenne Mountain SFS is located, the installation is more susceptible to impacts from some catastrophic natural (or human-caused) environmental events than most other installations. Specifically, flooding and wildland fires can have devastating effects on the site. In September of 2013 the area received just under an average annual amount of rainfall in a matter of a couple days. Flooding in one of the drainages resulted in severe erosion and deposition, closing off access to/from one of the entry portals to the interior of Cheyenne Mountain. Likewise, wildland fires can spread rapidly on the steep slopes, and burned trees can fall onto the access roads, again blocking access to and from the mountain portals. Remedies for erosion control are still in the planning stages, but actions are planned, as detailed in the Management Goals and Objectives section.



Constraints and Opportunities

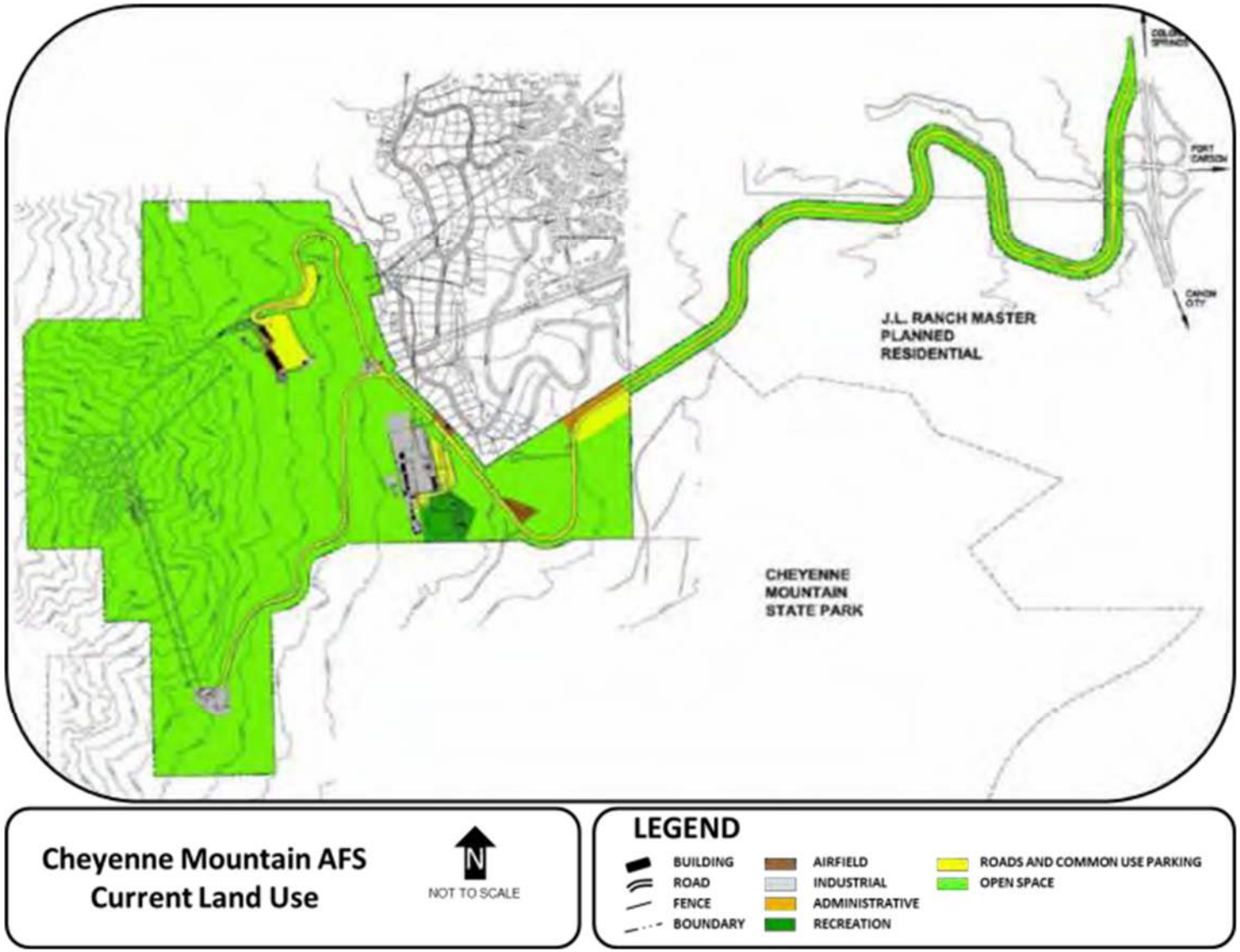
2.4.2 Land Use

Cheyenne Mountain SFS is comprised of 568 acres (230 hectares), mostly on steep, mountainous terrain. Lands at Cheyenne Mountain SFS are classified as either (1) improved grounds, (2) semi-improved grounds, or (3) unimproved grounds. Land use definitions follow:

- Improved Grounds: grounds on which personnel annually plan and perform intensive maintenance activities. These are developed areas of an installation that have lawns and landscape plantings that require intensive maintenance.
- Semi-improved Grounds: grounds where personnel perform periodic maintenance primarily for operational and aesthetic reasons (such as erosion and dust control).
- Unimproved Grounds: grounds not classified as improved or semi-improved and usually not mowed more than once a year.

These classifications generally correspond to maintenance levels as described in the Cheyenne Mountain SFS Landscape Plan (Rexroad APG 2008), and in the Grounds Maintenance section in this INRMP. At Cheyenne Mountain SFS, there are approximately 2 acres (0.8 hectares) of improved lands, 86 acres (35 hectares) of semi-improved lands, and 480 acres (194 hectares) of unimproved lands (Figure: Current Land Use on Cheyenne Mountains AFS).

The 2-mile access corridor from Highway 115 to the installation's front gate, NORAD Road, is Colorado Springs city property, for which Cheyenne Mountain SFS maintains an easement through agreement with the city. There is an access spur from NORAD Road to the Broadmoor Bluffs residential area approximately one-half mile from the gate.



Current Land Use on Cheyenne Mountain AFS

2.4.3 Current Major Impacts

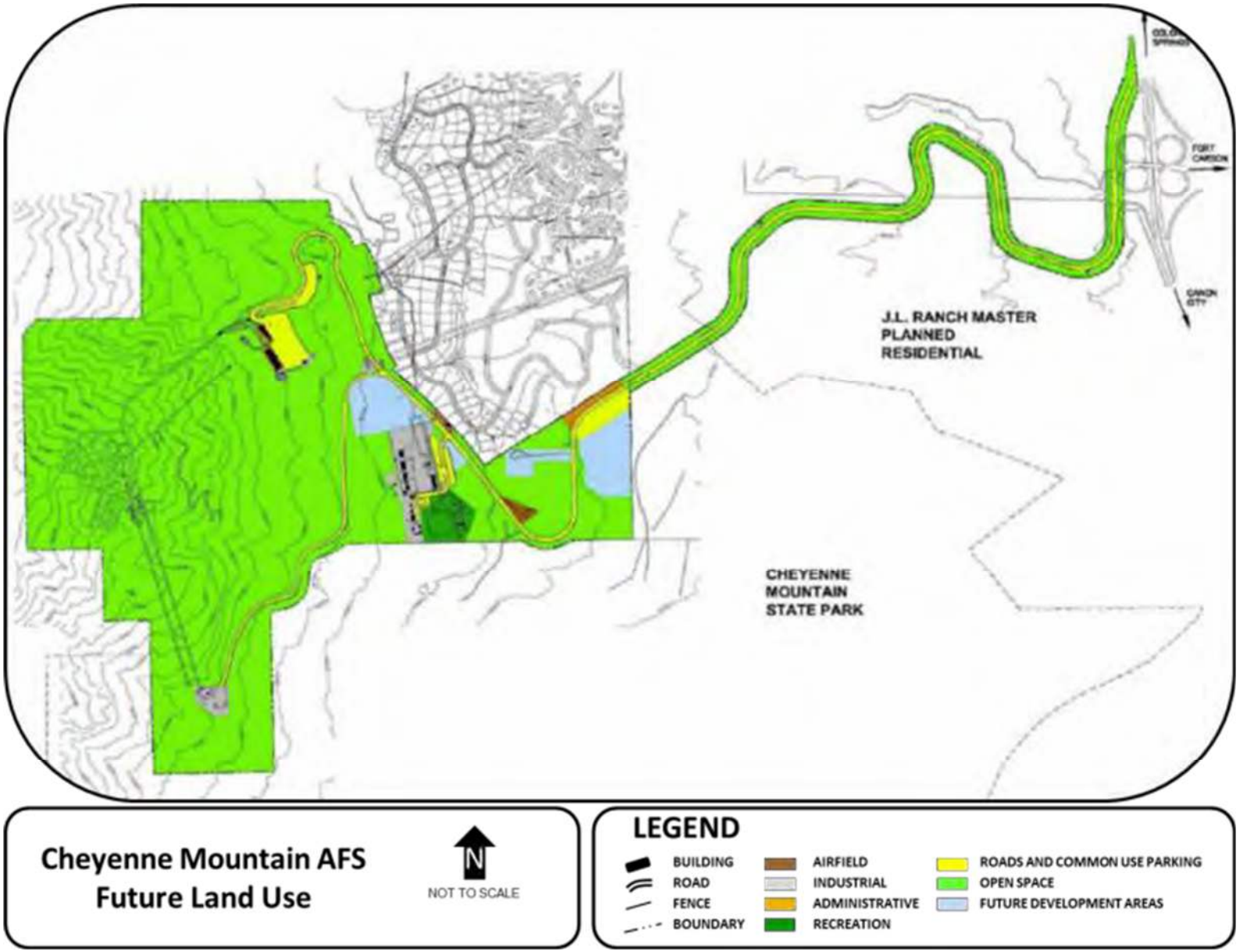
The current missions of Cheyenne Mountain SFS involve activities occurring within Cheyenne Mountain and do not significantly affect surface use of the installation. In fact, the presence of steep slopes over much of the installation limits the amount of space available for development of new facilities. Development in areas adjacent to Cheyenne Mountain SFS is a larger concern for natural resources management given encroachment (e.g., habitat loss).

The mission at Cheyenne Mountain SFS is not currently impacting natural resources. Air emissions, water quality and use, and waste generation, storage and disposal are all regulated. Adherence to these regulations and maintenance of associated permits is critical.

2.4.4 Potential Future Impacts

Potential future impacts on the local environment of Cheyenne Mountain SFS include the loss or destruction of resources and wildlife habitat from wildfire, pests and invasive species (plant, animal, and insect), new construction and normal maintenance activities, encroachment from surrounding areas, and other human activities. Figure: Future Land Use on Cheyenne Mountain SFS illustrates the future land use on Cheyenne Mountain SFS.

Cheyenne Mountain SFS is required to evaluate the impacts of construction and demolition activities on a project-specific basis through NEPA. The extent of impact to the environment, if any, will be disclosed by the public review process. Through the Installation Development Plan, environmental constraints are incorporated into the design, location, and operation of future facilities (Cheyenne Mountain AFS 2003). There are no known environmental constraints that would negatively impact such facilities, however.



Future Land Use on Cheyenne Mountain AFS

2.4.5 Natural Resources Needed to Support the Military Mission

Natural resources needed to support the military mission at Cheyenne Mountain SFS include habitat and species that provide positive aesthetic, social, and recreational attributes. These resources substantially contribute to the overall quality of life.

Unrestricted storm water runoff can significantly degrade natural resources. Discharge of storm water must be managed effectively in accordance with regulations. The storm water system on the installation is appropriately sized to meet the discharge requirements based on the rainfall that Cheyenne Mountain SFS receives on an annual basis. However, given the steep terrain and high erodibility of the soils, severe weather events including torrential rainfall can cause soil or rock slides that may block or undercut roads or otherwise impede access to facilities in particular and the site in general. A 100-year rainfall event in 2013 caused unprecedented flooding and soil erosion that blocked the north portal for weeks. Cheyenne Mountain SFS is pursuing measures to mitigate flooding and soil/rock slide events in future years.

Land is required to test, train, and perform missions at the installation level. Open areas provide buffers for areas with high-security requirements and maintain flexibility for future mission requirements.

3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

The AF environmental program adheres to the Environmental Management System (EMS) framework and it's Plan, Do, Check, Act cycle for ensuring mission success. Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, U.S. Department of Defense Instruction (DoDI) 4715.17, *Environmental Management Systems*, AFI 32-7001, *Environmental Management*, and international standard, ISO 14001:2004, provide guidance on how environmental programs should be established, implemented, and maintained to operate under the EMS framework.

The natural resources program employs EMS-based processes to achieve compliance with all legal obligations and current policy drivers, effectively managing associated risks, and instilling a culture of continuous improvement. The INRMP serves as an administrative operational control that defines compliance-related activities and processes.

4.0 GENERAL ROLES AND RESPONSIBILITIES

General roles and responsibilities that are necessary to implement and support the natural resources program are listed in the table below. Specific natural resources management-related roles and responsibilities are described in appropriate sections of this plan.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
Installation Commander	Has overall responsibility for the operation and management of Cheyenne Mountain SFS.
AFCEC Natural Resources Media Manager/Subject Matter Expert (SME)/ Subject Matter Specialist (SMS)	Oversees program to assist regional AF installations in the implementation of Natural Resources Management Programs.
Installation Natural Resources Manager/POC	The NRM is responsible for the successful implementation of the INRMP. Most of the activities called for in the INRMP can be undertaken by the NRM him/herself. When assistance is needed,

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
	the NRM can call upon cooperators from state or federal agencies, for example CPW biologists may help in raptor monitoring activities. The NRM will also coordinate the annual INRMP reviews with Sikes Act cooperators and update the plan in accordance with the results of that review process.
Installation Security Forces	Provides security and safety for Cheyenne Mountain SFS personnel.
Installation Unit Environmental Coordinators (UECs); see AFI 32-7001 for role description	Responsible for coordinating environmental actions in his/her functional area(s).
Installation Wildland Fire Program Manager	Acts as liaison to Wildland Fire Coordinator and manages wildland fire requirements.
Pest Manager	Oversees the Pest Management Program on Cheyenne Mountain SFS.
Range Operating Agency	N/A
Conservation Law Enforcement Officer (CLEO)	N/A
NEPA/Environmental Impact Analysis Process (EIAP) Manager	Prepares and analyses NEPA documents and is responsible for the distribution of such documents to pertinent entities for review.
National Oceanic and Atmospheric Administration (NOAA)/ National Marine Fisheries Service (NMFS)	N/A
US Forest Service	N/A
US Fish and Wildlife Service	Agreements between the U.S. Air Force and the USFWS allow for USFWS staffing assistance in implementing Air Force Natural Resource Management Programs.
The Installation Support Team (IST),	• Plans programs concerning conservation projects • Ensures the completion of INRMPs • Addresses technical questions that arise during implementation of the programs. • Responsible for ensuring development and implementation of the INRMP in coordination with the NRM.
The Regional Support Team (RST)	• Assists with the planning, programming, budgeting, and execution of the installation Natural Resources Management Program • Helps develop Space Force natural resource policy.
Chief of Environmental Element	The Chief is responsible for ensuring that the NRM has the needed resources available to accomplish his/her job.

5.0 TRAINING

AF installation NRMs/POCs and other natural resources support personnel require specific education, training and work experience to adequately perform their jobs. Section 107 of the Sikes Act requires that

professionally trained personnel perform the tasks necessary to update and carry out certain actions required within this INRMP. Specific training and certification may be necessary to maintain a level of competence in relevant areas as installation needs change, or to fulfill a permitting requirement.

Installation Supplement – Training

1. Natural resources management training is provided to ensure that base personnel, contractors, and visitors are aware of their role in the program and the importance of their participation to its success. Training records are maintained IAW the Recordkeeping and Reporting section of this plan.

6.0 RECORDKEEPING AND REPORTING

6.1 Recordkeeping

The installation maintains required records IAW Air Force Manual 33-363, *Management of Records*, and disposes of records IAW the Air Force Records Management System (AFRIMS) records disposition schedule (RDS). Numerous types of records must be maintained to support implementation of the natural resources program. Specific records are identified in applicable sections of this plan, in the Natural Resources Playbook and in referenced documents.

Installation Supplement – Recordkeeping

Click here to enter text.

6.2 Reporting

The installation NRM is responsible for responding to natural resources-related data calls and reporting requirements. The NRM and supporting AFCEC Media Manager and Subject Matter Specialists should refer to the Environmental Reporting Playbook for guidance on execution of data gathering, quality control/quality assurance, and report development.

Installation Supplement –Reporting

As a result of the many natural resources related surveys, inventories, and projects that have been conducted on Cheyenne Mountain SFS over the years, as well as the need for management guidance, several reports and plans have been developed that quantify natural resource elements and provide management strategies. A listing of those reports and plans can be found at Appendix H.

7.0 NATURAL RESOURCES PROGRAM MANAGEMENT

This section describes the current status of the installation's natural resources management program and program areas of interest. Current management practices, including common day-to-day management practices and ongoing special initiatives, are described for each applicable program area used to manage existing resources. Program elements in this outline that do not exist on the installation are identified as not applicable and include a justification, as necessary.

Installation Supplement –Natural Resources Program Management

Natural resource program management involves the integration of numerous management areas, including coordination among stakeholders, geographic information systems (GIS), watershed management, forest management, wildland fire management, wildlife management, TES management, integrated pest management, grounds maintenance, scenic resources, enforcement, and public outreach. This section describes current management practices employed at Cheyenne Mountain SFS and identifies management

issues that need to be considered to preserve and protect the natural resources. Through a holistic approach, management goals and objectives as well as projects can be identified.

The time and effort of many individuals, organizations, and agencies is required to ensure that Cheyenne Mountain SFS's mission is supported by protecting and enhancing the installation's natural resources through an effective Natural Resources Management Program. The Base Commander sits at the top ofthis pyramid. He/she has overall responsibility for seeing that the INRMP is completed and implemented. Below him/her are several organizations whose responsibilities may not be directly or fully involved in natural resources management, but whose assigned duties may relate to natural resources in one manner or another. One of these is Pest Management, who may be called upon to address issues relating to noxious weeds, and/or invasive, non-native or native, domestic, feral, or wild animals on the installation. The Fire Department is responsible for fire prevention and suppression on the site. In that capacity, the department will be consulted with on matters regarding fuels reduction and other means of wildland fire mitigation. Security will address issues of access to the installation as well as trespass on the site.

The Installation Support Team (IST), an Air Force function under the Air Force Civil Engineer Center (AFCEC), is responsible for planning programs concerning conservation projects, ensuring the completion of INRMPs, and addressing technical questions that arise during implementation of the programs. The Regional Support Team (RST) assists with the planning, programming, budgeting, and execution of the installation Natural Resources Management Program. The RST also helps develop Space Force natural resource policy.

In 2012 an Interservice Assistance Agreement (IAA) was developed between the USFWS and the Air Force allowing USFWS personnel to assist the Air Force in developing and implementing resource management programs on Air Force installations. Subsequently, in 2017 a Statement of Work (SOW) was prepared that allowed for USFWS staff assistance support for Peterson and Schriever AFBs and Cheyenne Mountain SFS. Aside from assisting with day-to-day resource management activities, the onsite USFWS Wildlife Biologist focuses on monitoring and managing that agency's trust resources: sensitive, threatened and endangered species and migratory birds.

The offices of Migratory Birds and Ecological Services, both of the USFWS, also play key roles in the development and implementation of natural resources on Cheyenne Mountain SFS. They provide input in the development of the INRMP, and assist with the review of the Natural Resources Management Program on an annual basis. Colorado Parks and Wildlife also reviews and provides input in the development of the INRMP and participates in the annual review process. The concurrence of both of these agencies on management policies and strategies is essential in making the Natural Resources Management Program a success.

7.1 Fish and Wildlife Management

Applicability Statement

This section applies to all AF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

Cheyenne Mountain SFS is committed to managing wildlife and habitats to sustain biological diversity. Several wildlife species occur in the coniferous forest and oak scrub communities on site. Current management strategies include protecting the site from wildfires and precluding use of the installation by

the general public. Additionally, the steep, mountainous terrain on most of the site is not suitable for typical wildlife management techniques involving habitat manipulation.

With the exception of migratory birds, wildlife in montane shrub and montane forest habitats along the Colorado Front Range are not typically migratory in the sense that there are no large-scale seasonal movements. Daily or small-scale seasonal movements among various habitat components are more typical of resident wildlife populations. Perimeter fencing and residential development in the vicinity of Cheyenne Mountain SFS could create a barrier to these movement patterns or alter behavior and distribution of some species.

The 2006 MOU signed by the DoD and the USFWS to promote the conservation of migratory birds in response to Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, emphasizes the shared responsibility to protect, restore, enhance, and manage habitats of migratory birds on DoD-managed lands as well as adjacent and surrounding area lands through cooperative conservation. The 2014 DoD *Strategic Plan for Bird Conservation on Department of Defense Lands* (U.S. Department of Defense 2014) further promotes proactive programs and projects, such as research and monitoring, to maintain and enhance migratory bird populations that use DoD lands. Collaborative projects may entail inventory and monitoring, research and management, and development of conservation measures. Emphasis on migratory bird conservation at Cheyenne Mountain SFS will be applied to project review and implementation to ensure compliance with the MBTA, which provides for protection against intentional and unintentional take, and compliance with Executive Order 13186. Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Most bird species in Colorado are protected under the MBTA.

Of particular importance to Cheyenne Mountain SFS is the stipulation that it is unlawful to destroy an active migratory bird nest, nestling, or eggs. With the exception of threatened and endangered species, whose nests are protected by the ESA, or bald or golden eagles, protected by the Bald and Golden Eagle Protection Act (however, under special provisions described in CFR 22.27, active or inactive eagle nests may be removed or relocated following issuance of a permit from the USFWS Migratory Bird Office), the USFWS allows inactive nests to be destroyed (USFWS 2003). However, active nests with attendant adults, their young, or the presence of eggs must be left undisturbed. Under the MBTA, the USFWS Migratory Bird Permit Office may issue Nest Depredation Permits, which would allow a permittee to remove an active nest. However, the USFWS issues few Nest Depredation Permits and only under very specific circumstances. Within Cheyenne Mountain SFS, the following protocol is used to minimize impacts to migratory birds protected under the MBTA:

1. If a project is proposed for implementation in a potential bird nesting area, strive to complete disruptive activities prior to nesting season. Inactive nests may be removed without a USFWS Depredation Permit for all migratory bird species except federally listed species and bald and golden eagles, for which permits are required.
2. If the project cannot occur outside the nesting season and impacts to nesting habitats are likely, surveys for active nests will be required prior to project implementation. Project proponents will need to provide the USFWS with justification for undertaking the project during the nesting season. If active nests are found in the proposed project area and the project must go forward with the likelihood that nest disturbance will occur, the USFWS Office of Migratory Birds must be consulted for guidance as to appropriate procedures to undertake to minimize impacts to nesting birds from project activities.

3. If no migratory birds are found nesting in the proposed project area immediately prior to project implementation, the project may proceed as planned.

All construction activities must be coordinated with the Cheyenne Mountain SFS NRM during all phases of the project, from planning through implementation.

In 2018 the USFWS changed its policy regarding incidental take of migratory birds, such that if an action results in the take of a migratory bird when the intent of that action was not the destruction of the bird, the agency or organization undertaking that action could not be held liable for a violation of the Migratory Bird Treaty Act (U.S. Fish and Wildlife Service 2018). However, the DoD has indicated that despite the USFWS determination regarding take of migratory birds, military elements should, "….continue to follow existing Department of Defense guidance designed to minimize – to the extent practicable and without diminishing the effectiveness of military readiness activities – the incidental take of migratory birds" (Office of the Assistant Secretary of Defense 2018).

Comprehensive inventories of Cheyenne Mountain SFS's floral and faunal resources were conducted in FY17. These included surveys for plants and vegetative communities, breeding birds, small mammals, reptiles and amphibians, and invertebrates. The methods adopted for these surveys, as well as the specific locations in which they are implemented, will be documented for repeatability. The surveys will be repeated every ten years thereafter.

The Cheyenne Mountain SFS Natural Resources Management Program is enhanced through an Interagency Assistance Agreement (IAA) established in 2012 between the USFWS and the USAF. This IAA allows for the cooperation between the respective agencies in resource management on USAF lands. The USFWS is providing staffing and other assistance as mutually agreed upon on a cost reimbursable basis. A USFWS staff biologist is present part time to assist in the development and implementation of the Cheyenne Mountain SFS Natural Resources Management Program.

It should be noted that, because NORAD Road from Highway 115 to the Cheyenne Mountain SFS gate is city property, any major planned undertakings within that corridor must be coordinated with the city of Colorado Springs.

7.2 Outdoor Recreation and Public Access to Natural Resources

Applicability Statement

This section applies to all AF installations that maintain an INRMP. Cheyenne Mountain SFS is required to implement this element.

Program Overview/Current Management Practices

Cheyenne Mountain SFS is a secure installation and public access to the site is restricted. Mountain Man Park, located south of the Building 300 area, is the only land area used for outdoor recreation. The area contains a softball field, picnic area, basketball and volleyball courts, horseshoe pits, a racquetball court, and pavilions. A paved nature trail surrounds the park area, providing hiking opportunities for Cheyenne Mountain staff. No hunting, camping, or other typical outdoor recreational activities are permitted on Cheyenne Mountain SFS.

7.3 Conservation Law Enforcement

Applicability Statement

This section applies to all AF installations that maintain an INRMP. The installation is required to implement this element.

Program Overview/Current Management Practices

Many aspects of natural resources management require effective environmental law enforcement. The Sikes Act mandates that DoD installations employ adequate numbers of professionally trained natural resources personnel, including law enforcement personnel, to implement the INRMP. The Act authorizes DoD to enforce all federal environmental laws, including the National Historic Preservation Act, Archeological Resources Protection Act, Migratory Bird Treaty Act, Clean Water Act, and Endangered Species Act, when violations occur on the installation. Cheyenne Mountain SFS is a secure installation that does not allow public access for recreational use. DoDI 4715.03, *Natural Resources Conservation Program* (August 31, 2018), states that "DoD Components shall coordinate with appropriate agencies to support conservation law enforcement to enforce Federal and applicable State laws and regulations pertaining to the management and use of the natural resources under their jurisdiction." While the 21 Security Forces Squadron Commander (SFS/CC) is responsible for the overall enforcement of federal and state laws and military regulations on Cheyenne Mountain SFS, if a conservation law enforcement issue arises, 21 CES and/or 21 SFS will contact CPW conservation officers who have jurisdiction for enforcement of state fish and game regulations, or USFWS special agents who have sole jurisdiction for enforcement of applicable federal laws.

A feasibility study for the implementation of conservation law enforcement on Front Range Air Force Bases was completed in 2015, and concluded with the recommendation that permanent law enforcement positions be stationed at the U.S. Air Force Academy and F.E. Warren AFB (Center for Environmental Management of Military Lands 2015). It was further recommended that the Air Force Academy conservation law enforcement officer (CLEO) assist with the rare conservation law enforcement issues that may occur on nearby Air Force and Space Force bases on an as-needed basis. Ultimately, however, it was felt that there was not enough need for conservation law enforcement on the bases to warrant creating a new position. Reasonable access to the base by federal and state conservation officers for the purpose of fish and wildlife law enforcement will be provided by the Commander, if necessary.

7.4 Management of Threatened and Endangered Species, Species of Concern and Habitats

Applicability Statement

This section applies to AF installations that have threatened and endangered species on AF property. This section **IS** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

Under the authority of the ESA of 1973, as amended, the USFWS lists species as federally endangered or threatened. Both the U.S. Air Force and Space Force are required to comply fully with the ESA (P.L. 93-205), except in situations deemed critical to the security of the United States. Air Force guidance for integrated natural resources management (AFMAN 32-7033) also recommends that installations afford protection to state-listed endangered, threatened, or protected species when possible.

In 2005 the Colorado Division of Wildlife (now CPW) developed the Colorado's Comprehensive Wildlife Conservation Strategy (Colorado Division of Wildlife 2005) in response to a national funding opportunity provided to states that develop such plans. This conservation strategy identifies Colorado wildlife species that are of greatest conservation need, as determined primarily by federal and state listing status, and inclusion in the Colorado Natural Heritage Program global and state ranking system. The conservation

strategy also addresses habitat types and relates wildlife species to those habitats. The 2005 Wildlife Conservation Strategy was revised as the State Wildlife Action Plan in 2015 (Colorado Parks and Wildlife 2015). See an overview of changes within the documents in Section 2.3.4 – Threatened and Endangered Species and Species of Concern.

The 1995 biodiversity study (Cheyenne Mountain Air Station 1995) and biological inventory of avifauna surveys (Engineering & Environment, Inc. 2005b) conducted at Cheyenne Mountain SFS for threatened, endangered, and sensitive wildlife species and their habitats documented the presence/absence of those species and potential habitats. To maintain a current awareness of floral and faunal species in general, and in sensitive species in particular, occurring at Cheyenne Mountain SFS, biodiversity surveys will be conducted every 10 years, subject to the availability of funds. These surveys were conducted in 2017 and 2018 (Sovell and Doyle *in prep*).

Only one federally listed species, the Mexican spotted owl, is a potential inhabitant of Cheyenne Mountain SFS. Although a Mexican spotted owl nest has been documented about 0.75 miles (1.2 kilometers) southwest of Cheyenne Mountain, no Mexican spotted owls responded during call solicitation surveys and no signs of their occurrence, such as whitewash or pellets, were detected during the preliminary baseline inventory of avifauna in August 2005 (Engineering & Environment, Inc. 2005b). However, as noted earlier, these surveys were not conducted in accordance with the USFWS Mexican spotted owl survey protocols for complete inventories (*see* Mexican Spotted Owl Survey Protocols Appendix). Complete inventories would require four surveys conducted from late March through late June for two consecutive years. Habitat on Cheyenne Mountain SFS generally is not ideal for Mexican spotted owls due to rocky and dry canyons with relatively patchy wooded areas; however, suitable habitat has been documented in the North Canyon at Cheyenne Mountain SFS based on the presence of a dense mixed conifer forest (Douglas-fir, ponderosa pine, and possibly white fir) on steep rocky slopes in a narrow canyon. With the exception of canyon length and water availability (the canyon at Cheyenne Mountain SFS is shorter and drier), such conditions are similar to conditions in the canyon to the south where a nesting pair of Mexican spotted owls has been observed. While the North Canyon at Cheyenne Mountain SFS contains suitable habitat, it is not considered to be prime breeding habitat due to its short length (L. Ellwood, USFWS Ecological Services, pers. comm., 19 November 2007).

Over the years, a number of federal actions and court decisions have changed the regulatory process relating to the Mexican spotted owl. The USFWS listed the Mexican spotted owl as threatened in 1993. On 1 February 2001, the USFWS completed a final designation of 4.6 million acres of critical habitat in Arizona, Colorado, New Mexico, and Utah. A Federal Court ruled on January 13, 2003, that the USFWS was arbitrary and capricious in their determination that Forest Service special management considerations adequately protected proposed critical habitat. The Court ordered the USFWS to re-propose critical habitat. On 18 November 2003, the USFWS issued a proposed rule reopening public comment on the proposed designation of critical habitat for the Mexican spotted owl (68 FR 65020). The final ruling on August 20, 2004, exempted Cheyenne Mountain SFS from the Mexican spotted owl critical habitat designation (USFWS 2004).

Critical habitat refers to specific geographic areas that are essential for the conservation of a threatened or endangered species and that may require special management considerations. Whenever the USFWS considers critical habitat, it reviews the basic needs of the species that include (1) space for individual and population growth and for normal behavior, (2) cover, food, water, and other basic requirements, and (3) sites for breeding and rearing young. Once these areas are identified, the USFWS selects those physical and biological features (i.e., Primary Constituent Elements) that are essential to conservation of the species. For canyon habitat, the Primary Constituent Elements include one or more of the following attributes: (1)

cooler and often more humid conditions than the surrounding area, (2) clumps or stringers of trees and/or canyon wall containing crevices, ledges, or caves, (3) high percent of ground litter and woody debris, and (4) riparian or woody vegetation (although not at all sites). An area must be both within the geographic boundary of designated critical habitat and it must contain the Primary Constituent Elements to be considered critical habitat. The USFWS determined that Cheyenne Mountain SFS lacks some or all of the Primary Constituent Elements necessary to be considered critical habitat for the Mexican spotted owl (USFWS 2004). Both the Recovery Plan for the Mexican spotted owl (Mexican Spotted Owl Recovery Team 2012) and critical habitat designation (USFWS 2004) identify that initial management of Mexican spotted owl habitat should focus on the alleviation of major threats, catastrophic wildfire and even-aged silviculture. Forest management practices identified in the Forest Management section of this INRMP reduce the risk of wildfire and loss of suitable Mexican spotted owl habitat on Cheyenne Mountain SFS. Further, there are no ongoing or planned activities at Cheyenne Mountain SFS in the area containing suitable habitat for the Mexican spotted owl in North Canyon. Forest management and wildland fire fuel reduction activities are limited to oak scrub communities and urban interfaces at lower elevations. In the event that activities are proposed in North Canyon, the Space Force will initiate Section 7 consultation with the USFWS to determine what actions, if any, are required to protect Mexican spotted owls and/or their habitat.

In accordance with recommendations from the USFWS Ecological Services Office, Mexican spotted owl call solicitation surveys should be conducted at least once every four years for monitoring purposes. Two surveys should be undertaken during each survey year; one in April to May to detect breeding adults, and another in June to detect nesting birds. If surveys are required for clearance purposes (for example if a mission or project is proposed to occur in potential owl habitat during the nesting season), complete inventories will be conducted prior to implementation of the proposed activity. That is, four surveys will be conducted from late March through late June for two consecutive years (L. Ellwood, USFWS Ecological Services, pers. comm., 19 February 2014). In addition, winter roost surveys will be conducted at least every four years, beginning in the 2017-2018 winter season. Detecting spotted owls during these surveys may result in an increase in survey frequency, following discussions with the USFWS Ecological Services Office. All data derived from these surveys, be it positive or negative, will be shared with stakeholders such as USFWS Ecological Services and Migratory Birds Offices, and with CPW. Surveyors need to obtain/maintain a scientific survey permit issued by the USFWS, and the Mexican spotted owl survey protocol (Mexican Spotted Owl Recovery Team 2012) is provided for reference in the Mexican Spotted Owl Survey Protocols Appendix. If Mexican spotted owls are detected in the canyon, additional conservation measures consistent with the 2012 Mexican Spotted Owl Recovery Plan (Mexican Spotted Owl Recovery Team 2012) would then be established. Mexican spotted owl surveys were not conducted in 2016 due to time constraints. However, breeding surveys were conducted in 2017 in the canyon that terminates adjacent to the North Portal; no spotted owls were detected during these surveys.

Wildlife species listed by the state of Colorado as endangered or threatened are protected under C.R.S. 33-2-105. Section 3 states that "it is unlawful for any person to take, possess, transport, export, process, sell or offer for sale, or ship and for any common or contract carrier to knowingly transport or receive for shipment any species or subspecies of wildlife appearing on the list of wildlife indigenous to this state determined to be endangered pursuant to subsection (1) of this section." Section 4 contains identical language for taxa listed as threatened.

Of 61 bird species identified as Tier 1 and 2 SGCN in Colorado's State Wildlife Action Plan (Colorado Parks and Wildlife 2015), six have been identified on Cheyenne Mountain SFS: golden eagle (T1), peregrine falcon (T2), prairie falcon (T2), rufous hummingbird (T2), lazuli bunting (T2), and Virginia's

warbler (T2). In addition, 1 of 36 Tier 1 and 2 mammals identified in the action plan is found on the installation: the black-tailed prairie dog (T2) is found on the corridor easement, NORAD Road, near its juncture with Highway 115. The Space Force is supporting maintenance of these and other wildlife species and populations through its policy of maintaining natural habitats and ecological systems.

As indicated in section 2.3.4, pollinators are fast becoming imperiled on a global scale. Every effort should be made to protect and enhance native pollinator populations as the opportunities to do so present themselves. To that end, seed mixes for habitat restoration projects will be reviewed to assess whether pollinator-friendly plant species might be incorporated into the prescriptions to benefit various pollinator species and communities.

Some pollinator populations in forests south, west, and north of Colorado Springs will have suffered a setback from the pesticide spraying operations conducted in June 2016 and again in June 2017 to fight the Douglas-fir tussock moth (*Orgyia pseudotsugata*) infestation (see section 7.8). A natural pesticide, *Bacillus thuringiensis* (B.t.), was used to combat the moth invasion, as well as to reduce a possible western spruce budworm (*Choristoneura freemani*) outbreak. Unfortunately, although B.t. does not affect most classes of arthropods and vertebrates, it will have deleterious effects on moths and butterflies. Therefore, lepidopteran pollinator populations would have been impacted by the operation. There is also some evidence that B.t. may be toxic to honeybees (Atkins 1991). The spraying operation did not occur on Cheyenne Mountain SFS, but spraying was conducted immediately to the southeast and northwest of the installation.

There are two stands of New Mexico locust (*Robinia neomexicana*) on Cheyenne Mountain SFS, one behind Fire Department Station 2 and the other in the southeastern corner of the installation. There was some interest in removing these stands because locust has long thorns that could be hazardous during wildland fire suppression operations. However, while visiting one of the stands during peak blossoming of its flowers in 2016, it was noted that the area was full of native bumblebees visiting the flowers for their nectar. Because these shrubs appear to greatly benefit pollinators, and in light of the fact they are native to Colorado, the New Mexico locust will not be removed. However, the stands will be monitored and may not be allowed to expand beyond their current distribution. The stands are not significantly large that wildland firefighters could not operate around them in fire suppression operations.

7.5 Water Resource Protection

Applicability Statement

This section applies to AF installations that have water resources. This section **IS** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

Watersheds are topographically delineated land areas that define and control the pattern of local surface water runoff. In natural resources management, a watershed unit is often used as the smallest boundary for water, soils, vegetation, and wildlife conservation efforts since resources are closely interacting at this landscape scale. Cheyenne Mountain SFS is generally within the headwaters of small ephemeral drainages that originate high on Cheyenne Mountain and traverse the facility in a general west to east direction. Overall, Cheyenne Mountain SFS is located within a single watershed that generally drains into the Limekiln Valley and is part of the Fountain Creek Watershed.

The Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management calls on federal agencies to work together and with states, tribes, local governments, private landowners, and other interested parties to take a watershed approach to federal land and resource management. This policy guides

the protection of water quality and aquatic ecosystem health through the reduction of polluted runoff, the improvement of natural resources stewardship, and an increase in public involvement in watershed management on federal lands. Watershed planning will include assessment and monitoring of watershed conditions and identification of priority watersheds on which to focus financial and other resources. Partners in establishing and carrying out the policy include the U.S. Departments of Agriculture, Interior, Commerce, Defense, and Energy, as well as the Environmental Protection Agency, Tennessee Valley Authority, and the Army Corps of Engineers. On Cheyenne Mountain SFS, watershed-scale management is a useful framework for maintaining critical land resources that provide wildlife habitat and promote compliance with various federal and state environmental laws (e.g., the Clean Water Act, Sikes Act, and Noxious Weed Act). Cheyenne Mountain SFS watershed management is primarily an effort to proactively minimize erosion. Watershed management, however, is also a critical aspect of habitat management.

Due to the steep topography and absence of any permanent or perennial water feature, watershed management on Cheyenne Mountain SFS is limited to controlling the velocity and rate of storm water runoff discharge. Storm water runoff could carry silt down to Fountain Creek which, due to significant land development upstream, may contribute to water quality impairment. Erosion control measures at Cheyenne Mountain SFS are directed at the right-of-way for NORAD Road, where construction activities have caused the most disruption of soil base and vegetative cover, and runoff impacts are magnified by the presence of impervious surfaces. All specifications and plans for proposed projects or undertakings are reviewed for potential impacts to soil stability.

As described in the Natural Resource Constraints to Mission and Mission Planning section, Cheyenne Mountain SFS experienced severe flooding and subsequent landslides during heavy rains in the fall of 2013 resulting in blocked access to some portions of the installation. Several drainages on the site currently exhibit severe erosion along with sloughing banks and undercut trees, but it is not known if these are residual effects of the 2013 flooding or if they are independent of that event. Hydrologic investigations are needed to determine the causes of the erosion, and to develop mitigative measures to reduce or eliminate the problems.

7.6 Wetland Protection

Applicability Statement

This section applies to AF installations that have existing wetlands on AF property. This section **IS NOT** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

There are no wetlands issues or concerns on Cheyenne Mountain SFS due to a lack of wetlands on the installation.

7.7 Grounds Maintenance

Applicability Statement

This section applies to AF installations that perform ground maintenance activities that could impact natural resources. This section **IS** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

Grounds maintenance practices strive to manage grounds in a manner that improves the aesthetic appearance of the installation while optimizing the protection of existing ecosystems. Effective grounds

maintenance at Cheyenne Mountain SFS has the potential to preserve the installation's historical character, improve its aesthetics, enhance the quality of life, conserve water and natural resources, and reduce landscape maintenance.

As Cheyenne Mountain SFS is located in drought-prone terrain, every effort is made to support naturally occurring growth of vegetation and to minimize water usage. The installation's Landscape Plan calls for adopting xeriscaping as a guiding principle in landscape planning and execution (Rexroad APG 2008). Two major considerations of xeriscaping are reduction in the use of water and planting native vegetation. The Cheyenne Mountain SFS landscape planners employ three levels of landscape development intensity on the site:

- Improved landscaping is found around facilities and infrastructure, where the grounds receive routine maintenance and may be irrigated. Manicured lawns are an example. Approximately 2 acres (1 hectare) of the base is in improved landscaping.
- Semi-improved landscaping typically serves as a buffer between the improved and the unimproved categories. It is generally employed along NORAD Road and in similar sites. Semi-improved areas may receive occasional mowing, but are generally not irrigated. About 90 acres (36 hectares) of Cheyenne Mountain SFS is semi-improved.
- Unimproved applies to grounds in an undisturbed, unmaintained condition. These areas are not maintained or irrigated. Approximately 476 acres (193 hectares) are unimproved.

A list of recommended native plant species for restoration and landscaping work on Cheyenne Mountain SFS that are suitable for the site's soils, climate, and elevational range can be found in the Plant Species Suitable for Cheyenne Mountain SFS's Soils and Elevational Range Appendix.

7.8 Forest Management

Applicability Statement

This section applies to AF installations that maintain forested land on AF property. This section **IS** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

Most of the undeveloped land (i.e., unimproved grounds as defined in AFMAN 32-7003) at Cheyenne Mountain SFS is vegetated with coniferous forests, oak scrub stands, or some combination of the two. As described in the Ecosystems and the Biotic Environment section, the higher elevations of Cheyenne Mountain SFS are characterized by coniferous vegetation ranging in coverage from the densely forested areas typical of the pine woodlands plant community to more sparsely vegetated areas of rock outcrop. The lower elevations at Cheyenne Mountain SFS are characterized by extensive, thick stands of oak scrub vegetation and a mixture of pine woodlands and oak scrub.

Cheyenne Mountain SFS's woodlands fall into two general habitat types as defined by the State Wildlife Action Plan: Oak and Mixed Mountain Shrub, and Mixed Conifer (Colorado Parks and Wildlife 2015). The shrub community will likely not be negatively impacted by naturally-occurring phenomena, and in fact may benefit from the results of climate change. The conifer habitats, however, could suffer as a result of climate change, with the advent of warmer temperatures and drier conditions, which could bring about increased insect outbreak, fire, and drought (Colorado Parks and Wildlife 2015).

The focus of forest management at Cheyenne Mountain SFS is conservation of forest resources, enhancement of the forest health, and reduction of wildland fire risk. The historic lack of forest management activities at Cheyenne Mountain SFS from its inception through the mid-1990s has created relatively unhealthy conditions due to excessive over- and understory densities, an abundance of downed trees, and an accumulated leaf/needle litter depth. This makes fuel loading and fire management high priorities. The overall lack of disturbance also has facilitated a shift in species composition toward species less associated with disturbance. Associated management issues include erosion control, fire control, pest and disease control, and maintenance of native wildlife habitats.

Forest management activities are directly related to erosion control. The sandy, loamy soils and steep topography at Cheyenne Mountain SFS make the site susceptible to severe erosion, particularly when the native vegetation is disturbed. Tree removal through construction activities or loss of trees to pests or disease can cause or accelerate surface erosion. Conversely, tree planting can promote soil development and stabilize slopes. On slopes where sheet wash erosion is a problem, an efficient control measure is creation of small terraces by placing downed logs across slopes. This allows sediment to build up above the logs, interrupting the slope and reducing runoff velocity. The logs will slowly decay and add to the soils' humic content. This method can be used in open glades and meadows, across rockslide areas, and within forest stands, as needed.

Biological impacts to forest health on Cheyenne Mountain SFS include the Ips beetle (*Ips pini*), the mountain pine beetle, the Douglas-fir tussock moth, and dwarf mistletoe (*Arceuthobium* spp.), the latter a tree parasite. All are natural stressors to conifer forests throughout western North America. Surveys conducted in 1999 reportedly detected tree damage consistent with the dwarf mistletoe and mountain pine beetles (*Dendroctonus ponderosae*). In October 2005, a follow-on pest survey was conducted in select areas to identify trees with insect/disease occurrences, trees in otherwise poor health, and dead trees still standing deemed a hazard (Engineering & Environment, Inc. 2005c). Seventy-two locations of trees were identified and recorded, typically with multiple trees per location. The majority of those locations consisted of trees suspected of being infected with dwarf mistletoe. One mountain pine beetle infected tree was observed. Several dead trees were identified that had fallen onto the perimeter fenceline, compromising its integrity. These trees have been removed from the forest. In the future, any dead trees located near the perimeter fence will be removed before they fall on the fence.

In addition, some trees situated near paved surfaces (roads, parking areas) where magnesium chloride is used during the winter seasons for melting ice and snow appear to have been affected by the compound. The chloride in magnesium chloride is toxic to trees, restricting water and nutrient levels in the leaves and needles (Goodrich and Jacobi 2014). The distal ends of leaves and needles are affected first, but continual and/or repeated exposure to the compound will eventually kill the tree itself. There are no known non-chloride based road deicers on the market at this time that are economically feasible to use.

Important as wildlife habitat, areas where low branch and seedling growth is naturally promoted include clearings and the margins of existing stands, as these areas are first to be colonized by new seed sources. Also obvious are Gambel oak thickets where wild turkeys find shelter and feed on mast. No more than five standing dead trees (snags) per acre, as available and appropriate, will be left in place as they provide habitat for cavity-dwelling animals, hunting perches for raptors, and ultimately return to the soil as available nutrients. Coarse woody debris (downed trees or logs) and small debris (slash) piles will be retained as microhabitat but not at densities sufficient to increase the risk of catastrophic wildfires or increase population densities of the mountain pine beetle.

The Forest Management Plan (Engineering & Environment, Inc. 2005a) describes forest management activities relevant to Cheyenne Mountain SFS with particular emphasis on managing forest lands to increase their overall health. This entails addressing stand density, insect and disease occurrences, and wildland fire risk within the context of a desired future condition for each forest community. At the outset the Plan calls for thinning mixed conifer and oak brush stands, and removing diseased trees. Across forest communities, the plan recommends installation-wide delineation of individual stands or management areas based on vegetation type and evaluation of their current condition, inventories every 10 years with pre- and post-treatment inventories conducted when applying silvicultural prescriptions, use of GIS to support forest planning and management, and local and regional partnerships in the management of forest resources.

Another forest stand inventory was conducted in 2017. Cheyenne Mountain SFS's forests were partitioned into 56 discreet units, defined by the species, density, and canopy cover of the vegetation growing within each respective unit, as determined through GIS interpretation. A management prescription was then developed for each unit. In general, management prescriptions include removing ladder fuels and thinning tree and shrub stands to reduce wildland fire hazards, and removing and debarking beetle-infested trees. Every attempt to remove salvageable trees shall be made in order to remove fuels from the forest. Limbs and woody debris less than four inches in diameter will be piled for future prescription burns, mastication, shipping or wildlife habitat. Trees that are cut, but cannot be removed will be felled cross-slope to help reduce downslope soil erosion.

Due to the nature of the local forest products industry as well as the relatively small, forested areas available on Cheyenne Mountain SFS for such activities, commercial timber harvests are typically not economically feasible. The NRM will continue to seek the most beneficial outcome for all forest products removed from the Base. Most trees that are cut through forest stand prescription operations or due to forest health concerns are cut into firewood. This wood is either sold to onsite buyers or transported to another DoD facility within the Colorado Springs area, to be incorporated into their firewood sales program. Monies generated from onsite sales are deposited into the Peterson AFB qualified recycling program or transferred to appropriate DoD facility and their firewood sales program.

Additional guidance in tree planting, maintenance, and removal may be found in Section 2.9, Natural Resources, of the Business Practices for Environmental Compliance for Projects and Services, maintained by the Cheyenne Mountain SFS Environmental Office. The Business Practices for Environmental Compliance were developed to establish guidelines relative to environmental concerns during construction projects, and may be found at Appendix H.

See section 7.11, Integrated Pest Management Program, for an overview of forest insect and disease issues and control.

7.9 Wildland Fire Management

Applicability Statement

This section applies to AF installations with unimproved lands that present a wildfire hazard and/or installations that utilize prescribed burns as a land management tool. This section **IS** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

Wildfires are common along the Front Range, particularly in the oak scrub plant community. The most dangerous lightning strike area in Colorado, taking into account the transient (tourist and commuting) and resident populations, is the greater Colorado Springs region, with over 27,000 cloud-to-ground lightning

strikes per year (13 cloud-to-ground strikes per square mile per year) (Office of Emergency Management,n.d.). Lightning and human activity are the primary causes of fire. The wildland fire season lasts from April through October, although fires can occur whenever snow is absent. The last major wildfire affecting the area where Cheyenne Mountain SFS is now located was in 1950, prior to military construction (New Mexico Engineering Research Institute 2003). Continued development of the land surrounding Cheyenne Mountain SFS, continued growth of the Gambel oak thickets, infestations of pine bark beetle, and tree diseases increase the risk of wildfires in the general vicinity of Cheyenne Mountain SFS.

Fire is a necessary component of a healthy ecosystem that promotes diversity, controls insects and disease, and aids in controlling invasive weed infestations. The last major forest fire on Cheyenne Mountain SFS occurred in 1950 prior to the installation's establishment. As such, forests on Cheyenne Mountain SFS, and indeed across the western United States, have been altered through fire exclusion to forest conditions atypical of the historic norm (heavy accumulations of dead vegetation, altered fuel arrangement, and changes in vegetative structure and composition [Arno et al. 1995]). Consequently, forest fires may burn with greater intensity and spread more rapidly than historically.

Because of the steep terrain, and close proximity of residential areas, prescription burning is suited to limited areas of Cheyenne Mountain SFS. However, controlled burns, pile burning and the use of curtain burners are invaluable tools in establishing a useful forest management strategy. In 2020, a contract was let to examine 12 forest stands and begin marking trees and understory vegetation for removal, in an attempt to reduce the wildfire hazard and improve forest health. This is the first wildfire/forest management effort since 2014 and is intended to be the start of a multi-phased , multi-year strategy to reduce wildfire risk while establishing a more natural forest mosaic. The success of the Fire Management Program directly impacts the accomplishment of the entire mission at Cheyenne Mountain SFS. Mission support, ecosystem management, and protection of life and property all depend on a professionally managed Wildland Fire Management Program. As described in the Ecosystems and the Biotic Environment section, the fuel load on Cheyenne Mountain is a potential threat to the resources on Cheyenne Mountain SFS. The goals for fire management on Cheyenne Mountain SFS include protection of human health and safety, prevention of all uncontrolled fires, emergency preparedness for a possible wildfire, and habitat enhancement/protection during fire management activities.

The Cheyenne Mountain SFS Fire and Emergency Services (21 CES/CEF) has primary responsibility for mitigation and/or fighting forest fires. The 21 CES/CEIE (Environmental) has primary responsibility for forest health. Many of the forest health management activities (thinning forest density, brush and deadfall reduction, pest control, etc.) also contribute to fuel load reduction. Natural resource management activities that affect wildland fire potential will be coordinated with the Cheyenne Mountain SFS Fire Department. Existing improved areas, structures, and roads provide limited firebreaks, but the terrain precludes adequate firebreaks over much of the site. Non-emergency fire mitigation measures initiated by the Cheyenne Mountain SFS Fire Department that potentially affect natural resources will be coordinated with the Cheyenne Mountain SFS NRM. Routine meetings with the Fire Chief are required to ensure that all natural resource management actions are consistent with the emergency preparedness procedures.

The capabilities of the Cheyenne Mountain SFS Fire Department to reduce and control potential wildland fires are augmented through a Memorandum of Agreement (MOA) with the Colorado Springs Fire Department and an inter-service support agreement (ISSA) with the Fort Carson Fire and Emergency Response Team. In the event a wildland fire does occur, recovery of the forest stands and thickets can be promoted by adopting measures as described in the Forest Management Plan and by calling on resources such as Fort Carson and Cheyenne Mountain State Park.

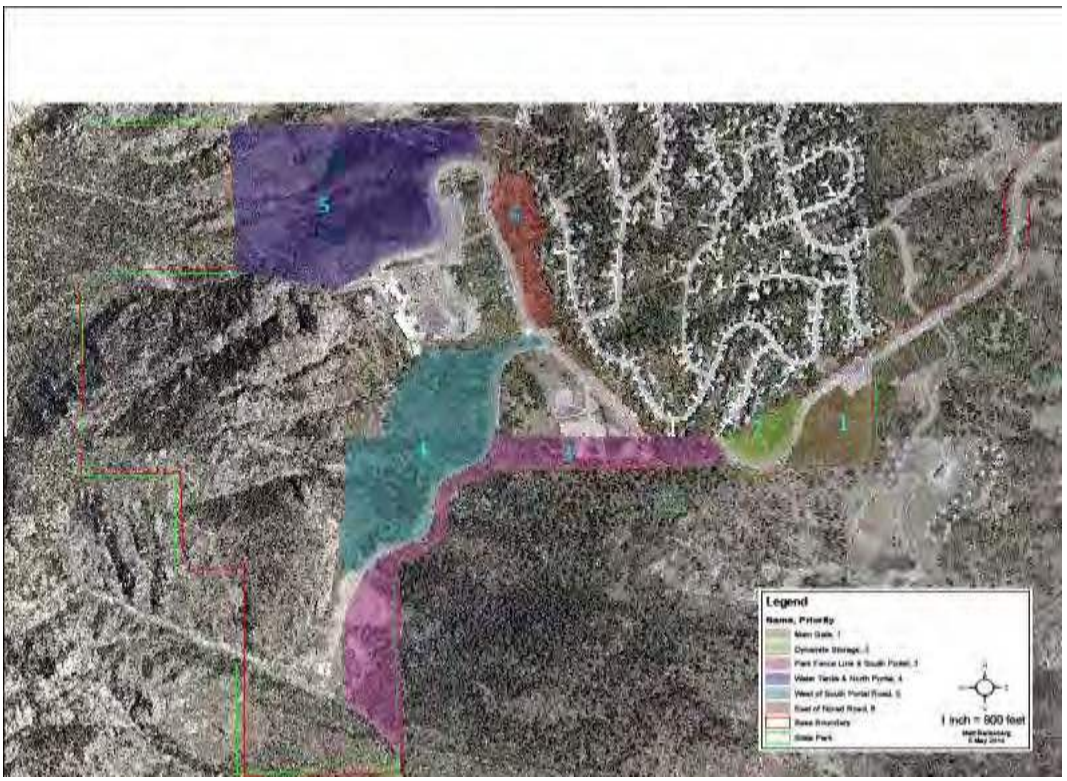
Meanwhile, a six-member USFWS wildland fire crew has been stationed at Cheyenne Mountain SFS. They

stand ready to respond to requests for assistance in battling wildfires on military installations throughout the region. In their down time, their primary tasks include fuels reduction in wild land environments, assistance in removal of beetle infested trees, and habitat improvement projects.

A 2007 Wildland Fire Management Plan modeled fuel loads and predicted wildland fire behavior to provide management methods for fire control and defense at Cheyenne Mountain SFS. Based on the specifics of this plan, wildland fire management efforts will be directed toward implementing fire mitigation measures. The principal focus of the environmental effort will be to improve forest health by reducing forest density, reducing the amount of brush and deadfall, pest control, and reduction of low branches. These activities also will reduce fuel loading and ladder fuels that have the potential to allow grass/brush fires to move into the tree crowns, dramatically increasing the potential severity of a fire.

In 2014, Cheyenne Mountain SFS's undeveloped areas were prioritized into six cutting units in an operation aimed at reducing the risk of wildland fires (see figure: Prioritized wildland fire mitigation cutting units). In July and again in November of that year cutting operations were conducted, concentrating primarily on Gambel oak and mixed Gamble oak/coniferous forest stands. U.S. Forest Service chainsaw crews were used in the operations coordinated through the Wildland Fire Center located at Eglin Air Force Base in Florida. In July a total of about 19.1 acres were cut at a cost of approximately $3,477 per acre by a crew of ten. In November a crew of six cut about 5.4 acres at a cost of approximately $6,146 per acre. The terrain in the November cutting operation was considerably more difficult than in the July operation. Unfortunately, Gamble oak readily regenerates from cut stems and in 10 years a treated area will again be covered with vigorous oak saplings. In 2017 regenerating oak in the target areas were chemically treated and then masticated. These areas in time should turn into grasslands. The mitigation cutting areas are shown in Figure: 2014 wildland fire mitigation cutting acreages.

Cheyenne Mountain SFS's Wildland Fire Management Plan was completed in 2015.



Prioritized Wildland Fire Mitigation Cutting Units

2014 Wildland Fire Mitigation Cutting Acreages

7.10 Agricultural Outleasing

Applicability Statement

This section applies to AF installations that lease eligible AF land for agricultural purposes. This section **IS NOT** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

There is no agricultural outleasing program on Cheyenne Mountain SFS and no potential to have one in the future.

7.11 Integrated Pest Management Program

Applicability Statement

This section applies to AF installations that perform pest management activities in support of natural resources management, e.g. invasive species, forest pests, etc. This section **IS** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

Pests may include weeds, invertebrates, birds, feral and free-ranging domestic dogs and cats, snakes, nematodes, snails, algae, fungal plant diseases, and other undesirable organisms. Control programs are carried out when pests impair safe and efficient land use, pose health or safety hazards to humans or animals, or impair military operations. Integrated Pest Management procedures are to be used when practical. Management must ensure that pests are controlled effectively and economically, while contamination of the environment and risks to human health caused by pest control measures are held to a minimum.

Forest Insects

Several insect pests are prevalent in forests of the Front Range, including species of bark beetles and defoliating insects. Of primary concern at Cheyenne Mountain SFS are the Ips beetle and, to a lesser extent, the Douglas-fir beetle and the spruce budworm. These pests can damage and kill coniferous trees and may occur in widespread epidemics. Insect populations sometimes can be controlled or reduced by removing infested trees. In FY16 five ponderosa pine trees were removed due to Ips beetle infestation, four additional ponderosas were removed in FY17. Once the trees are cut, the wood is laid out under clear plastic sheeting so solar radiation will kill the beetles under the bark, to preclude them from infesting other trees. Another technique is to remove the bark after felling the trees.

Also, traps can be deployed to attract beetles away from desirable trees. Funnel traps use a pheromone impregnated bait to lure Ips beetles away from ponderosas. Once caught in the funnel system the beetles cannot escape and infest other trees. Eight traps were deployed in FY18, and they have proven successful in capturing Ips pine beetles.

In July 2014 a Douglas-fir tussock moth outbreak was detected on CPW property immediately adjacent to Cheyenne Mountain SFS. Douglas-fir tussock moths attack Douglas-fir, true fir, and spruce trees; the caterpillars feed on the tree needles and essentially defoliate the trees from the top down (Wickman et al. 1998, Stephens and Powell 2015). The infestation soon spread to fir trees on the installation along South Portal Road. In 2015 the moth eruption resumed in this area. In July of that year U.S. Forest Service entomology personnel collected 50 larval specimens from along South Portal Road and submitted them to a research laboratory to be tested for the presence of nuclear polyhedrosis virus (NPV). NPV will often infect tussock moth larvae following 2-3 years of a moth infestation, causing a massive die-off of the population. The test results came back positive for NPV (Powell 2015), and soon after the specimens were collected the Douglas-fir tussock moth population on Cheyenne Mountain SFS crashed. The trees that were affected during the 2015 season did not appear to suffer complete defoliation as did the trees impacted in 2014. A follow-up field survey conducted by the Forest Service entomology personnel in 2016 found few indicators of new or emergent tussock moths, and few to no egg masses (Stephens and Powell 2016).

The U.S. Forest Service Office of Forest Health Protection monitored the Douglas-fir tussock moth eruption in the Cheyenne Mountain area. That office recommended against spraying insecticides to control the moth population, in anticipation of the natural population crash caused by NPV (Powell 2015), as well as to avoid potential impacts to nontarget lepidopteran species. In 2016 the greater Colorado Springs community decided to conduct a spraying operation in June along the Front Range in the Colorado Springs area to ensure a conclusion to the moth infestation and to help reduce a follow-on outbreak of western spruce budworm. Cheyenne Mountain SFS, however, did not participate in the operation. In June 2017 Colorado Springs again sprayed in the foothills areas adjacent to the city for spruce budworm, and again Cheyenne Mountain SFS did not participate in the operation.

A map of the approximate area impacted by Douglas-fir tussock moth on Cheyenne Mountain SFS in 2014 and 2015 is found in the figure below.

Finally, in the spring of 2017 two ornamental spruce trees situated near the entrance to the installation were treated for white pine weevil (*Pissodes strobi*).

Noxious Weeds

In 2011 a Commander's Guide on Invasive Species was developed to highlight the issue of invasive species on military reservations, describe impacts to military resources and mission resulting from the presence of invasive species, and provide an overview of the strategies many installations are employing to combat invasive species (Boice et al. 2011). In conclusion, the guide offered the following points to be considered when managing for invasive species:

- reduce new invasions and stop the expansion of established invaders.
- focus on the military mission; invasive species degrade the landscape, resulting in less realistic training scenarios.
- minimize harmful environmental impacts of management actions, such as harmful side effects of control actions.
- engage in partnerships to maximize control efforts.
- and conduct long-term monitoring to guard against the establishment of invasives, and/or the reinvasion of areas already treated.

Article 5.5-108 of Colorado Revised Statute Title 35 defines three classes of noxious weeds within the state according to occurrence, threat level, and ease of control. The three weed classes are as follow:

List A, rare noxious weed species that are subject to eradication wherever detected statewide in order to protect neighboring lands and the state as a whole.

List B, noxious weed species with discrete statewide distributions that are subject to eradication, containment, or suppression in portions of the state designated by the commissioner in order to stop the continued spread of these species.

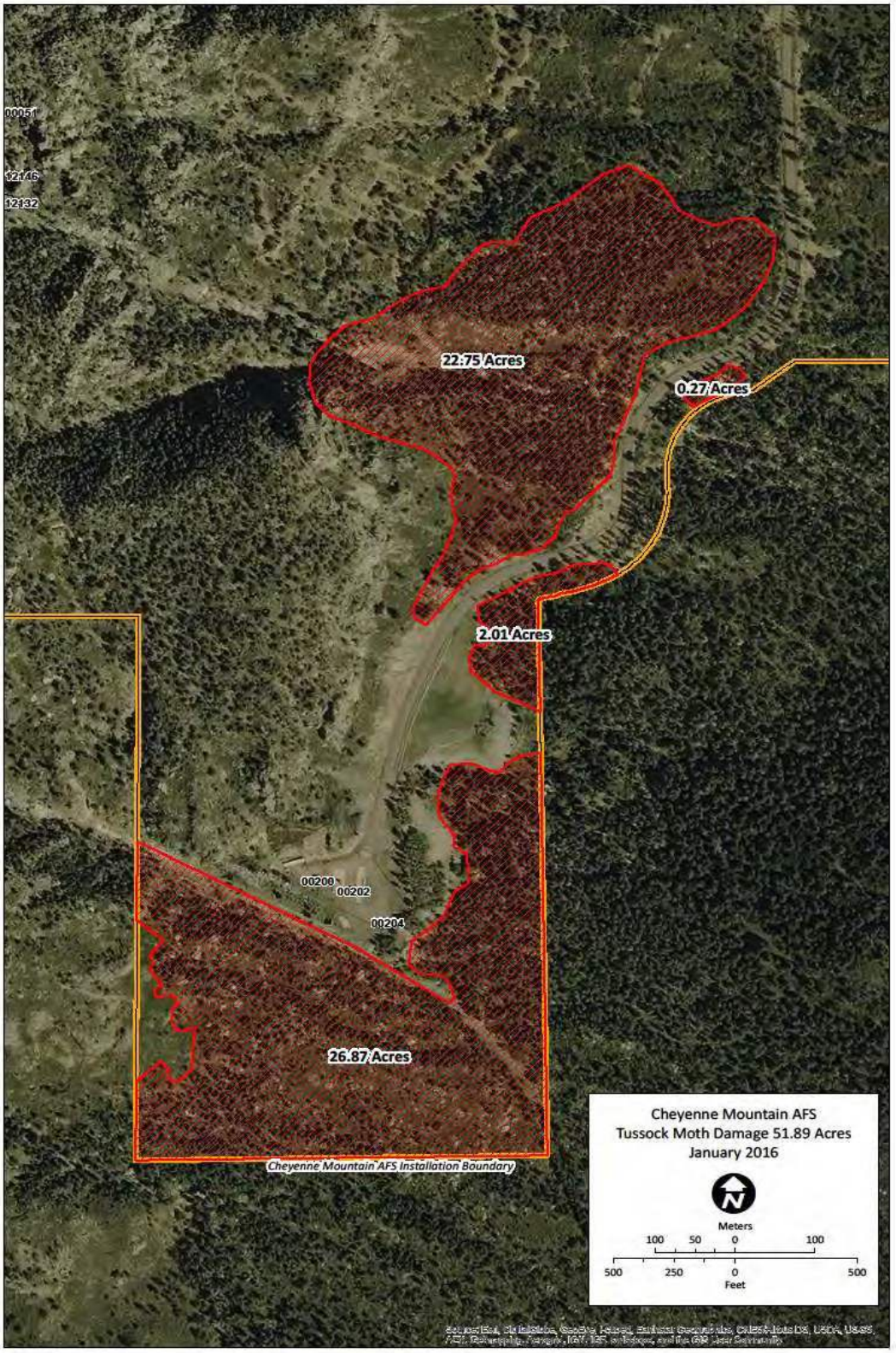
List C, widespread and well-established noxious weed species for which control is recommended but not required by the state, although local governing bodies may require management.

The Colorado Weed Management Association defines a fourth class: Watch List Species, or those non-native species whose impacts and distribution are not yet well understood (Colorado Weed Management Association 2013). Finally, some noxious weeds, although problematic, are too widespread and numerous to be considered for control, and therefore are not on the Colorado list.

The AF uses the state lists as guidance in prioritizing the management of noxious weeds on federally controlled installations in Colorado noxious weed regulations. 7 USC 2814, Management of Undesirable Plants on Federal Lands, does not contain a waiver of sovereign immunity to state or local law but requires cooperation with the state to manage undesirable plant species.

List A species are designated for statewide eradication. To ensure that seeds or other reproductive propagules are not produced or spread, any plant with flowers, seeds, or other propagules must be placed in sealed plastic bags and disposed of by:

- high intensity burning in a controlled environment that completely destroys seed viability;
- removal of plant materials to a solid waste landfill, which covers refuse daily with six inches of soil or alternative material; or
- any other method approved by the Commissioner.



Approximate area of 2014-2015 Douglas-fir tussock moth infestation damage.

A survey conducted in June 2004 identified ten invasive plant species on Cheyenne Mountain SFS (North Wind, Inc. 2005). The area was resurveyed in 2014 by CNHP and, with the exception of plumeless thistle, all the species found by North Wind in 2004 were identified during the 2014 surveys. The CNHP surveys also recorded seven additional species, including cypress spurge, a list A species. These weeds were generally found in undeveloped areas and on the periphery of improved/semi-improved areas. Noxious weed surveys were conducted again in August, 2016. A couple additional species were detected during this survey effort. In addition, another Class A species, Myrtle spurge (*Euphorbia myrsinites*), was located on an old two-track trail high on the mountainside above the North Portal. This cluster of plants will be removed prior to it going to seed in 2018. The following table indicates noxious weed species found on Cheyenne Mountain SFS from 2004 through 2017.

Noxious Weeds Identified on Cheyenne Mountain SFS – 2004, 2014, 2016, 2017

Common Name	Scientific Name	State Class	2004[1]	2014[2]	2016[3]	2017[4]
Cypress spurge	*Euphorbia cyparissias*	A		X	X	
Myrtle spurge	*Euphorbia myrsinites*	A				X
Bull thistle	*Cirsium vulgare*	B	X	X	X	
Canada thistle	*Cirsium arvense*	B	X	X	X	
Chinese clematis	*Clematis orientalis*	B		X	X	
Cutleaf teasel	*Dipsacus laciniatus*	B			X	
Diffuse knapweed	*Centaurea diffusa*	B		X	X	
Musk thistle	*Carduus nutans*	B	X	X	X	
Plumeless thistle	*Carduus acanthoides*	B	X			
Russian-olive	*Eleagnus angustifolia*	B	X	X	X	
Scotch thistle	*Onopordum acanthium*	B		X		
Spotted knapweed	*Centaurea maculosa*	B		X	X	
Tamarisk	*Tamarix ramosissima*	B	X	X		X
Yellow toadflax	*Linaria vulgaris*	B		X	X	
Common burdock	*Arctium minus*	C			X	
Common mullein	*Verbascum thapsus*	C			X	
Field bindweed	*Convolvulus arvensis*	C	X	X	X	
Downy brome, Cheatgrass	*Bromus tectorum*	C	X	X	X	
Redstem filaree	*Erodium cicutarium*	C			X	
Kochia	*Kochia scoparia*	Not Listed	X	X		
Russian thistle	*Salsola kali*	Not Listed	X	X		
Siberian elm	*Ulmus pumila*	Not Listed		X		

[1]North Wind 2005
[2]Unpubl. field data, Colorado Natural Heritage Program
[3]Ageiss 2016
[4]Documented during non-weed related field activities

As they spread, these species become difficult to control and pose an invasive threat to the native vegetation. Control priorities were developed using the National Park Service Exotic Species Ranking System, which analyzes each invasive species based on interactions between significance of ecological impacts and feasibility of control. Through active management, invasive plant species at Cheyenne Mountain SFS can be treated relatively easily using a combination of chemical, mechanical, manual, cultural and/or biological controls. Noxious weeds will be monitored annually by the NRM as part of his/her general field activities, and comprehensive surveys will be conducted once every five years. Noxious weed control will be an annual site-wide operation as needed. Through this regimen, Cheyenne Mountain SFS will remain in compliance with federal policies, regulations, and Executive Orders and contribute to Colorado's efforts to control noxious weeds.

Chemical pesticides will be used only after non-chemical methods prove to be unsuccessful or impractical to eradicate pests or inadequate to meet mission requirements. Only pesticides under the approved listing of DoD pesticides may be used. Any chemical or biological pesticides will be used only after minimum risk to the mission, installation personnel, civilian community, and environment has been determined. Pesticide use shall be coordinated with the installation Pest Manager, and pesticides shall be applied in a manner that complies with all applicable laws and regulations in accordance with the Integrated Pest Management Plan (Cheyenne Mountain AFS 2005c).

In 2015 approximately 0.8 acres of Canada thistle were treated with herbicide on Cheyenne Mountain SFS. This acreage consisted of about 22 stands of varying sizes of the noxious weed, mostly in the lower administrative area. The treatment was effective, but follow-up treatments are required, and additional stands of Canada thistle, as well as musk and bull thistle, have since been located. Canada thistle was again treated in 2016. In 2017 approximately 16 acres of Canada, musk, and bull thistles, and diffuse knapweed, were treated.

One of the two small populations of cypress spurge located near Building 101 was hand-pulled in 2015; the other was buried during a construction project in the area. In the spring of 2016 a few plants were found at the locations of both populations and both were treated with herbicide. Again, the treatment proved effective; only a couple plants were observed later in the year and the areas were subsequently treated in 2017. No cypress spurge was observed at these locations in 2018.

Noxious weeds are controlled through manual, mechanical, biological, cultural, and/or chemical means. Chemical applications can often be the most expedient and effective strategy for attacking weeds. However, chemical treatments can pose severe implications for the surrounding environment. For example, some pesticides can negatively impact pollinators, such as butterflies and bees, feeding on the plants post-treatment. As much as appropriate and feasible, chemicals that have the least impacts to pollinators and other environmental elements but yet are effective in weed control will be employed on Cheyenne Mountain SFS. In addition, spot treatment with herbicides, as opposed to broadcast treatment, will be employed as much as possible and feasible.

7.12 Bird/Wildlife Aircraft Strike Hazard (BASH)

Applicability Statement

This section applies to AF installations that maintain a BASH program to reduce wildlife-related hazards to aircraft operations. This section **IS NOT** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

There are no Bird/Wildlife Aircraft Strike Hazard (BASH) concerns on Cheyenne Mountain SFS.

7.13 Coastal Zone and Marine Resources Management

Applicability Statement

This section applies to AF installations that are located along coasts and/or within coastal management zones. This section **IS NOT** applicable to Cheyenne Mountain SFS.

Program Overview/Current Management Practices

There are no coastal zone or marine resource management issues on Cheyenne Mountain SFS.

7.14 Cultural Resources Protection

Applicability Statement

This section applies to AF installations that have cultural resources that may be impacted by natural resource management activities. This section **IS** applicable to Cheyenne Mountain AFB.

Program Overview/Current Management Practices

Cheyenne Mountain SFS has been surveyed for historic and for archaeological resources. Eighteen facilities in the outer-mountain and inner-mountain complexes have been determined to be eligible for inclusion on the National Register of Historic Places based on their association with significant United States missile activities during the Cold War era (T N & Associates 2009). At this time, an additional 13 resources are anticipated to be determined officially eligible for the National Register as consultation with stakeholders is completed. Cheyenne Mountain SFS has in place a Programmatic Agreement with the Colorado State Historic Preservation Officer (SHPO) that defines the requirements for consultation on maintenance and repair activities within the Cheyenne Mountain Operations Center Historic District. That agreement is in effect until 2026.

7.15 Public Outreach

Applicability Statement

This section applies to all AF installations that maintain an INRMP. Cheyenne Mountain SFS is required to implement this element.

Program Overview/Current Management Practices

Cheyenne Mountain SFS is a small site with high-level security requirements that restrict public access. Within these limits, Cheyenne Mountain SFS must interface with the public to review environmental documents and management plans.

7.16 Geographic Information Systems (GIS)

Applicability Statement

This section applies to all AF installations that maintain an INRMP, since all geospatial information must be maintained within the AF GeoBase system. Cheyenne Mountain SFS is required to implement this element.

Program Overview/Current Management Practices

Geographic information systems enable land managers to manage resources spatially with an associated database. Cheyenne Mountain SFS is in the process of implementing a GIS to comply with a requirement that all data be Environmental Systems Research Institute (ESRI) ArcGIS 9.3 geodatabase format or higher and Spatial Data Standards for Facilities Infrastructure and Environment (SDSFIE) U.S. Air Force 3.0 compliant. All data collected shall incorporate the coordinate and projection system specified as Colorado State Plane, NAD 83, Central Zone 0502, U.S. Survey Feet. This will allow data to be added to the system when it is available. Typical databases, such as the biological inventory, have been supplied in Access format, and all future inventory projects will be required to include ESRI compatible/SDSFIE compliant data layers. Availability of a GIS will augment natural resource management efforts at Cheyenne Mountain SFS, particularly as they relate to forest management.

Successful implementation of the INRMP involves the collection, analysis, and synthesis of data sets and their incorporation into the decision-making process. Information technology including a GIS represents a mechanism to communicate across all operations at Cheyenne Mountain SFS. The goal is to have information on natural resources easily accessible and incorporated into management decisions. Information sharing with outside organizations will be conducted on a case-by-case basis.

8.0 MANAGEMENT GOALS AND OBJECTIVES

The installation establishes long term, expansive goals and supporting objectives to manage and protect natural resources while supporting the military mission. Goals express a vision for a desired condition for the installation's natural resources and are the primary focal points for INRMP implementation. Objectives indicate a management initiative or strategy for specific long or medium range outcomes and are supported by projects. Projects are specific actions that can be accomplished within a single year. Also, in cases where off-installation land uses may jeopardize AF missions, this section may list specific goals and objectives aimed at eliminating, reducing or mitigating the effects of encroachment on military missions. These natural resources management goals for the future have been formulated by the preparers of the INRMP from an assessment of the natural resources, current condition of those resources, mission requirements, and management issues previously identified. Below are the integrated goals for the entire natural resources program.

The installation goals and objectives are displayed in the 'Installation Supplement' section below in a format that facilitates an integrated approach to natural resource management. By using this approach, measurable objectives can be used to assess the attainment of goals. Individual work tasks support INRMP objectives. The projects are key elements of the annual work plans and are programmed into the conservation budget, as applicable.

Installation Supplement – Management Goals and Objectives

GOAL 1: MAINTAIN CHEYENNE MOUNTAIN SFS INRMP

- OBJECTIVE 1.1: Remain current with biological data relating to Cheyenne Mountain SFS environmental parameters.
  - PROJECT 1.1.1: Conduct breeding Mexican spotted owl surveys every four years.
  - PROJECT 1.1.2: Conduct Mexican spotted owl winter roost surveys every four years.
  - PROJECT 1.1.3: Establish and conduct comprehensive biodiversity inventories every 10 years.
- OBJECTIVE 1.2: Maintain a proactive relationship with Sikes Act cooperators relative to the Cheyenne Mountain SFS Natural Resources Management Program.

- PROJECT 1.2.1: Revise the Cheyenne Mountain INRMP in coordination with the Sikes Act cooperators.
- PROJECT 1.2.2: Conduct annual reviews of the Cheyenne Mountain SFS INRMP with the Sikes Act cooperators.

GOAL 2: MAINTAIN A HEALTHY ECOSYSTEM COMPATIBLE WITH MISSION REQUIREMENTS

- OBJECTIVE 2.1: Inventory and control noxious weeds on Cheyenne Mountain SFS.
  - PROJECT 2.1.1: Conduct annual noxious weed surveys.
  - PROJECT 2.1.2: Undertake control measures on noxious weeds identified during surveys.
  - PROJECT 2.1.3: Conduct annual tree pathogens surveys.
  - PROJECT 2.1.4: Remove specific trees that are infected with tree pathogens identified during surveys.
- OBJECTIVE 2.2: Reduce/Prevent soil erosion on Cheyenne Mountain SFS.
  - PROJECT 2.2.1: Investigate the severity of soil erosion issues associated with drainage systems on the installation.
  - PROJECT 2.2.2: Develop and implement soil erosion mitigative measures if necessary.
- Objective 2.3: Maintain a healthy forest on Cheyenne Mountain SFS.
  - PROJECT 2.3.1 Conduct a Forest Stand Inventory Project.
- Objective 2.4: Survey, monitor, and apply management actions, if necessary, to protect sensitive/rare floral and faunal species.

GOAL 3: WILDLAND FIRE MITIGATION

- OBJECTIVE 3.1: Implement wildland fire mitigation measures.
  - PROJECT 3.1.1: Thin/remove approximately 75 acres of mixed conifer forest stands over a period of three years.
  - PROJECT 3.1.2: Thin/remove approximately 45 acres of scrub oak stands over a period of three years.
  - PROJECT 3.1.3: Remove slash piles resulting from mitigation cutting operations.

9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

9.1 Natural Resources Management Staffing and Implementation

Implementation

Implementation of this INRMP is dependent on work plans to accomplish projects, professionally trained staff, annual reviews of plan effectiveness, and monitoring plans. Work plans for project implementation including schedules and funding sources are provided in the Annual Work Plan section.

The Base Civil Engineer is primarily responsible for the overall success of the Natural Resources Program. Specifically, the NRM is responsible for the successful implementation of the INRMP. Most of the activities called for in the INRMP can be undertaken by the NRM him/herself. When assistance is needed, the NRM can call upon cooperators from state or federal agencies, for example CPW biologists may help in raptor monitoring activities. The NRM will also coordinate the annual INRMP reviews with Sikes Act cooperators and update the plan in accordance with the results of that review process.

Natural Resources Management Staffing

As indicated above, the NRM is the primary individual responsible for ensuring successful implementation of the INRMP. That individual will generally be a GS Series 0401. The Chief of Environmental Element is the next in the chain of command in guaranteeing that the obligations set forth in the INRMP are met. The Chief is responsible for ensuring that the NRM has the needed resources available to accomplish his/her job. Other individuals and services, such as the Pest Manager, the Chief of the installation Fire Department, and the Base Civil Engineer may also directly or indirectly play a role in the successful implementation of the INRMP.

Agreements between the U.S. Air Force and the USFWS allow for USFWS staffing assistance in implementing both Air Force and Space Force Natural Resource Management Programs.

9.2 Monitoring INRMP Implementation

The tasks identified in Chapter 10, Work Plans, will be reviewed annually for completion in each respective fiscal year. This exercise will be undertaken in conjunction with the annual review process with Sikes Act cooperators, namely the USFWS and CPW.

9.3 Annual INRMP Review and Update Requirements

The IST is responsible for ensuring development and implementation of the INRMP in coordination with the NRM. This is accomplished through annual reviews and incorporating minor updates and revisions. Major rewrites, due to significant changes to the site, regulations, Air Force Instruction, etc. will be implemented through projects under the direction of the NRM.

In coordination with the appropriate USFWS and CPW offices, the NRM will conduct annual reviews to evaluate the progress of INRMP implementation and to make recommendations on how management actions need to be adjusted to improve the efficiency and effectiveness of the plan. Components will include the review of all goals/objectives/projects, monitoring data, undertakings that required submission of Air Force Forms 332 or 813, and stakeholder involvement activities. Annual reviews will result in adding a work plan for another year of projects to the INRMP. The target date for conducting annual reviews is immediately following the close of each fiscal year (i.e., between 1 October and 30 November).

A critical consideration is to ensure that there is no net loss of military capability as a result of implementing the INRMP. Specifically, this evaluation will require careful examination of management objectives from which annual projects are developed. There may be instances in which a “net loss” may be unavoidable in order to fulfill regulatory requirements other than the Sikes Act (e.g., complying with a biological opinion under the provisions of the ESA). Loss of mission capability in these instances will be identified in the INRMP and a discussion included of measures taken to recapture or mitigate the net loss.

Consensus should be reached on (1) whether or not the INRMP was fully implemented, and (2) whether or not the management scheme was effective. Findings from this annual review will be presented as part of updates to the commander on the status and effectiveness of the INRMP. On completion of an annual review, the NRM will prepare written documentation to include:

1. The year the most recent INRMP was completed or revised
2. The organizations contacted and/or that participated in coordination
3. Feedback (if any) from the coordination groups/organizations
4. Any changes made as a result of the coordination and status of project funding
5. Accomplishments for the previous year and planned future events

6. Determination of whether the INRMP requires revision

As the foundation for adaptive management on-installation, these annual reviews will help keep the INRMP current and relevant with the incorporation of new projects, additional data, new understanding of natural processes and species, knowledge of other installation operations impacting natural resources, and lessons learned from completed and ongoing projects.

To ensure the continued utility of this plan, periodic updates will be conducted that account for changes in the military mission, condition of natural resources, the ecosystem, regulatory requirements, and incorporation of lessons learned through adaptive management. More specifically, the INRMP will be updated for the following reasons: (1) when mission interference or lack of mission support requires a change in natural resource management direction, (2) when ecological monitoring data reveals management actions are having a negative effect on the resources and have reached a threshold of significance, requiring a fundamental change in management methods, and (3) when new laws or regulations require additions or deletions of management activities. If major revisions are needed, the NRM should outline a schedule to accomplish the revision and notify the RST.

All periodic updates to the INRMP will be documented by the NRM in a Master Update List. Relevant INRMP sections and pages should be referenced as well as a brief description of the update and the corresponding rationale.

10.0 ANNUAL WORK PLANS

The INRMP Annual Work Plans are included in this section. These projects are listed by fiscal year, including the current year and four succeeding years. For each project and activity, a specific timeframe for implementation is provided (as applicable), as well as the appropriate funding source, and priority for implementation. The work plans provide all the necessary information for building a budget within the AF framework. Priorities are defined as follows:

1. High: The INRMP signatories assert that if the project is not funded the INRMP is not being implemented and the Space Force is non-compliant with the Sikes Act; or that it is specifically tied to an INRMP goal and objective and is part of a “Benefit of the Species” determination necessary for ESA Sec 4(a)(3)(B)(i) critical habitat exemption.
2. Medium: Project supports a specific INRMP goal and objective, and is deemed by INRMP signatories to be important for preventing non-compliance with a specific requirement within a natural resources law or by EO 13112 on Invasive Species. However, the INRMP signatories would not contend that the INRMP is not be implemented if not accomplished within programmed year due to other priorities.
3. Low: Project supports a specific INRMP goal and objective, enhances conservation resources or the integrity of the installation mission, and/or support long-term compliance with specific requirements within natural resources law; but is not directly tied to specific compliance within the proposed year of execution.

FY19 Projects

Project	Priority	Funding Source	OPR
Project 2.1.2: Conduct noxious weed control installation-wide.	Medium	Project # SAXCOS201219	USFWS
Project 1.2.2: Conduct Annual Reviews of the Cheyenne Mountain SFS INRMP with the Sikes Act coordinators.	High	In house	USFWS
Project 2.1.3: Conduct tree pathogens surveys in mixed conifer habitats.	Medium	In house	USFWS
Project 2.1.4: Remove/treat specific diseased trees.	Medium	In house	USFWS

FY20 Projects

Project	Priority	Funding Source	OPR
Project 2.1.2: Conduct noxious weed control installation-wide.	Medium	Project # SAXCOS201220	USFWS
Project 1.2.2: Conduct Annual Reviews of the Cheyenne Mountain SFS INRMP with the Sikes Act coordinators.	High	In house	USFWS
Project 2.1.3: Conduct tree pathogens surveys in mixed conifer habitats.	Medium	In house	USFWS
Project 2.1.4: Remove/treat specific diseased trees.	Medium	In house	USFWS
Project 2.4.1: Conduct surveys, monitoring, management actions for sensitive/rare species.	Medium	Project # SAXC401120	USFWS
Project 3.1.1: Thin/remove approximately 75 acres of mixed conifer forest stands over a period of three years	Medium	Project# SAXC102320	USACE
Project 3.1.2: Thin/remove approximately 25 acres of scrub oak stands over a period of three years.	Medium	Project# SAXC102320	USACE

FY21 Projects

Project	Priority	Funding Source	OPR
Project 2.1.2: Conduct noxious weed control installation-wide.	Medium	Project # SAXCOS201221	USFWS
Project 1.2.2: Conduct Annual Reviews of the Cheyenne Mountain SFS INRMP with the Sikes Act coordinators.	High	In house	USFWS
Project 2.1.3: Conduct tree pathogens surveys in mixed conifer habitats.	Medium	In house	USFWS
Project 2.1.4: Remove/treat specific diseased trees.	Medium	In house	USFWS
Project 2.4.1: Conduct surveys, monitoring, management actions for sensitive/rare species.	Medium	Project # SAXC401121	USFWS

FY22 Projects

Project	Priority	Funding Source	OPR
Project 2.1.2: Conduct noxious weed control installation-wide.	Medium	Project # SAXCOS201222	USFWS
Project 1.2.2: Conduct Annual Reviews of the Cheyenne Mountain SFS INRMP with the Sikes Act coordinators.	High	In house	USFWS
Project 2.1.3: Conduct tree pathogens surveys in mixed conifer habitats.	Medium	In house	USFWS
Project 2.1.4: Remove/treat specific diseased trees.	Medium	In house	USFWS
Project 2.4.1: Conduct surveys, monitoring, management actions for sensitive/rare species.	Medium	Project # SAXC401122	USFWS
Project 3.1.1: Thin/remove approximately 75 acres of mixed conifer forest stands over a period of three years	Medium	Project # SAXC102322	BASE
Project 3.1.2: Thin/remove approximately 25 acres of scrub oak stands over a period of three years.	Medium	Project # SAXC102322	BASE

FY23 Projects

Project	Priority	Funding Source	OPR
Project 2.1.2: Conduct noxious weed control installation-wide.	Medium	Project # SAXCOS201223	USFWS
Project 1.2.2: Conduct Annual Reviews of the Cheyenne Mountain SFS INRMP with the Sikes Act coordinators.	High	In house	USFWS
Project 2.1.3: Conduct tree pathogens surveys in mixed conifer habitats.	Medium	In house	USFWS
Project 2.1.4: Remove/treat specific diseased trees.	Medium	In house	USFWS
Project 2.4.1: Conduct surveys, monitoring, management actions for sensitive/rare species.	Medium	Project # SAXC401123	USFWS

11.0 REFERENCES

11.1 ***Standard References*** *(Applicable to all AF installations)*

4. AFMAN 32-7003, *Environmental Conservation*
5. Sikes Act
6. eDASH Natural Resources Program Page
7. Natural Resources Playbook – a Internal AF reference available at https://cs1.eis.af.mil/sites/ceportal/CEPlaybooks/NRM2/Pages/

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12.0 ACRONYMS

12.1 Standard Acronyms (Applicable to all AF installations)

- eDASH Acronym Library
- Natural Resources Playbook – Acronym Section
- U.S. EPA Terms & Acronyms

12.2 Installation Acronyms

- **AFI -** Air Force Instruction
- **AFMAN -** Air Force Manual
- **AFS** - Air Force Station
- **AFSPC -** Air Force Space Command
- **AWC -** Air Warning Center
- **BCC -** Birds of Conservation Concern
- **CCC -** CMD Command Center
- **CLEO** - Conservation Law Enforcement Officer
- **CMD -** Cheyenne Mountain Directorate
- **CMOC -** Cheyenne Mountain Operations Center
- **CNHP -** Colorado Natural Heritage Program
- **CPW -** Colorado Parks and Wildlife
- **DSP -** Defense Support Program
- **EQ -** Environmental Quality
- **IAA -** Interagency Assistance Agreement
- **ICBM -** intercontinental ballistic missiles
- **INRMP -** Integrated Natural Resources Management Plan
- **IPaC** - Information for Planning and Construction
- **ISSA -** inter-service support agreement
- **JSPOC -** Joint Space Operations Center
- **MAP -** Management Action Plan

- **MCC -** Missile Correlation Center
- **MOU -** Memorandum of Understanding
- **MSG -** Mission Support Group
- **NORAD -** North American Aerospace Defense Command
- **NPV** - nuclear polyhedrosis virus
- **OIW -** Operational Intelligence Watch
- **OPR** - Office of Primary Responsibility
- **PIF -** Partners in Flight
- **PPBE** - Planning, Programming, Budgeting and Execution
- **SAIA -** Sikes Act Improvement Act
- **SGCN -** Species of Greatest Conservation Need
- **SLBM** - submarine-launched ballistic missiles
- **TBMW -** Theater Ballistic Missile Warning
- **TES -** Threatened and Endangered Species
- **USNORTHCOM -** U.S. Northern Command
- **USSTRATCOM -** U.S. Strategic Command

13.0 DEFINITIONS

13.1 Standard Definitions (Applicable to all AF installations)

- Natural Resources Playbook – Definitions Section

13.2 Installation Definitions

- Add unique state, local and installation-specific definitions

14.0 APPENDICES

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP

Federal Public Laws and Executive Orders	
National Defense Authorization Act of 1989, Public Law (P.L.) 101-189; Volunteer Partnership Cost-Share Program	Amends two Acts and establishes volunteer and partnership programs for natural and cultural resources management on DoD lands.
Defense Appropriations Act of 1991, P.L. 101-511; Legacy Resource Management Program	Establishes the "Legacy Resource Management Program" for natural and cultural resources. Program emphasis is on inventory and stewardship responsibilities of biological, geophysical, cultural, and historic resources on DoD lands, including restoration of degraded or altered habitats.
EO 11514, Protection and Enhancement of Environmental Quality	Federal agencies shall initiate measures needed to direct their policies, plans, and programs to meet national environmental goals. They shall monitor, evaluate, and control agency activities to protect and enhance the quality of the environment.
EO 11593, Protection and Enhancement of the Cultural Environment	All Federal agencies are required to locate, identify, and record all cultural resources. Cultural resources include sites of archaeological, historical, or architectural significance.
EO 11987, Exotic Organisms	Agencies shall restrict the introduction of exotic species into the natural ecosystems on lands and waters which they administer.
EO 11988, Floodplain Management	Provides direction regarding actions of Federal agencies in floodplains, and requires permits from state, territory and Federal review agencies for any construction within a 100-year floodplain and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for acquiring, managing and disposing of Federal lands and facilities.
EO 11989, Off-Road vehicles on Public Lands	Installations permitting off-road vehicles to designate and mark specific areas/trails to minimize damage and conflicts, publish information including maps, and monitor the effects of their use. Installations may close areas if adverse effects on natural, cultural, or historic resources are observed.
EO 11990, Protection of Wetlands	Requires Federal agencies to avoid undertaking or providing assistance for new construction in wetlands unless there is no practicable alternative, and all practicable measures to minimize harm to wetlands have been implemented and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.
EO 12088, Federal Compliance With Pollution Control Standards	This EO delegates responsibility to the head of each executive agency for ensuring all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the U.S. Environmental Protection Agency (US EPA) authority to conduct

Federal Public Laws and Executive Orders	
	reviews and inspections to monitor Federal facility compliance with pollution control standards.
EO 12898, Environmental Justice	This EO requires certain federal agencies, including the DoD, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations.
EO 13112, Exotic and Invasive Species	To reduce the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds	The U.S. Fish and Wildlife Service (USFWS) has the responsibility to administer, oversee, and enforce the conservation provisions of the Migratory Bird Treaty Act, which includes responsibility for population management (e.g., monitoring), habitat protection (e.g., acquisition, enhancement, and modification), international coordination, and regulations development and enforcement.
United States Code	
Animal Damage Control Act (7 U.S.C. § 426-426b, 47 Stat. 1468)	Provides authority to the Secretary of Agriculture for investigation and control of mammalian predators, rodents, and birds. DoD installations may enter into cooperative agreements to conduct animal control projects.
Bald and Golden Eagle Protection Act of 1940, as amended; 16 U.S.C. 668-668c	This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Act.
Clean Air Act, (42 U.S.C. § 7401– 7671q, July 14, 1955, as amended)	This Act, as amended, is known as the Clean Air Act of 1970. The amendments made in 1970 established the core of the clean air program. The primary objective is to establish Federal standards for air pollutants. It is designed to improve air quality in areas of the country which do not meet Federal standards and to reduce significant deterioration in areas where air quality exceeds those standards.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Superfund) (26 U.S.C. § 4611–4682, P.L. 96-510, 94 Stat. 2797), as amended	Authorizes and administers a program to assess damage, respond to releases of hazardous substances, fund cleanup, establish clean-up standards, assign liability, and other efforts to address environmental contaminants. Installation Restoration Program guides cleanups at DoD installations.
Endangered Species Act (ESA) of 1973, as amended; P.L. 93-205, 16 U.S.C. § 1531 et seq.	Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Under this law, no Federal action is allowed to jeopardize the continued existence of an endangered or threatened species. The ESA requires consultation with the USFWS and the NOAA Fisheries (National Marine Fisheries Service) and the preparation of a biological evaluation or a biological

Federal Public Laws and Executive Orders	
	assessment may be required when such species are present in an area affected by government activities.
Federal Aid in Wildlife Restoration Act of 1937 (16 U.S.C. § 669–669i; 50 Stat. 917) (Pittman-Robertson Act)	Provides Federal aid to states and territories for management and restoration of wildlife. Fund derives from sports tax on arms and ammunition. Projects include acquisition of wildlife habitat, wildlife research surveys, development of access facilities, and hunter education.
Federal Environmental Pesticide Act of 1972	Requires installations to ensure pesticides are used only in accordance with their label registrations and restricted-use pesticides are applied only by certified applicators.
Federal Land Use Policy and Management Act, 43 U.S.C. § 1701–1782	Requires management of public lands to protect the quality of scientific, scenic, historical, ecological, environmental, and archaeological resources and values; as well as to preserve and protect certain lands in their natural condition for fish and wildlife habitat. This Act also requires consideration of commodity production such as timbering.
Federal Noxious Weed Act of 1974, 7 U.S.C. § 2801–2814	The Act provides for the control and management of non-indigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.
Federal Water Pollution Control Act (Clean Water Act [CWA]), 33 U.S.C. §1251–1387	The CWA is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Primary authority for the implementation and enforcement rests with the US EPA.
Fish and Wildlife Conservation Act (16 U.S.C. § 2901–2911; 94 Stat. 1322, PL 96-366)	Installations encouraged to use their authority to conserve and promote conservation of nongame fish and wildlife in their habitats.
Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.)	Directs installations to consult with the USFWS, or state or territorial agencies to ascertain means to protect fish and wildlife resources related to actions resulting in the control or structural modification of any natural stream or body of water. Includes provisions for mitigation and reporting.
Lacey Act of 1900 (16 U.S.C. § 701, 702, 32 Stat. 187, 32 Stat. 285)	Prohibits the importation of wild animals or birds or parts thereof, taken, possessed, or exported in violation of the laws of the country or territory of origin. Provides enforcement and penalties for violation of wildlife related Acts or regulations.
Leases: Non-excess Property of Military Departments, 10 U.S.C. § 2667, as amended	Authorizes DoD to lease to commercial enterprises Federal land not currently needed for public use. Covers agricultural outleasing program.
Migratory Bird Treaty Act 16 U.S.C. § 703–712	The Act implements various treaties for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful without a valid permit.
National Environmental Policy Act of 1969 (NEPA), as amended; P.L. 91-190, 42 U.S.C. § 4321 et seq.	Requires Federal agencies to utilize a systematic approach when assessing environmental impacts of government activities. Establishes the use of environmental impact statements. NEPA proposes an interdisciplinary approach in a decision-making process designed to identify unacceptable or unnecessary impacts on the environment. The Council of Environmental Quality (CEQ) created Regulations for Implementing the National Environmental Policy Act [40 Code of

Federal Public Laws and Executive Orders	
	Federal Regulations (CFR) Parts 1500– 1508], which provide regulations applicable to and binding on all Federal agencies for implementing the procedural provisions of NEPA, as amended.
National Historic Preservation Act, 16 U.S.C. § 470 et seq.	Requires Federal agencies to take account of the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP). Provides for the nomination, identification (through listing on the NRHP), and protection of historical and cultural properties of significance.
National Trails Systems Act (16 U.S.C. § 1241–1249)	Provides for the establishment of recreation and scenic trails.
National Wildlife Refuge Acts	Provides for establishment of National Wildlife Refuges through purchase, land transfer, donation, cooperative agreements, and other means.
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd–668ee)	Provides guidelines and instructions for the administration of Wildlife Refuges and other conservation areas.
Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. § 3001–13; 104 Stat. 3042), as amended	Established requirements for the treatment of Native American human remains and sacred or cultural objects found on Federal lands. Includes requirements on inventory, and notification.
Rivers and Harbors Act of 1899 (33 U.S.C. § 401 et seq.)	Makes it unlawful for the USAF to conduct any work or activity in navigable waters of the United States without a Federal Permit. Installations should coordinate with the U.S. Army Corps of Engineers (USACE) to obtain permits for the discharge of refuse affecting navigable waters under National Pollutant Discharge Elimination System (NPDES) and should coordinate with the USFWS to review effects on fish and wildlife of work and activities to be undertaken as permitted by the USACE.
Sale of certain interests in land, 10 U.S.C. § 2665	Authorizes sale of forest products and reimbursement of the costs of management of forest resources.
Soil and Water Conservation Act (16 U.S.C. § 2001, P.L. 95-193)	Installations shall coordinate with the Secretary of Agriculture to appraise, on a continual basis, soil/water-related resources. Installations will develop and update a program for furthering the conservation, protection, and enhancement of these resources consistent with other Federal and local programs.
Sikes Act (16 U.S.C. § 670a–670l, 74 Stat. 1052), as amended	Provides for the cooperation of DoD, the Departments of the Interior (USFWS), and the State Fish and Game Department in planning, developing, and maintaining fish and wildlife resources on a military installation. Requires development of an Integrated Natural Resources Management Plan and public access to natural resources, and allows collection of nominal hunting and fishing fees. NOTE: AFMAN 32-7003 sec 3.11. Staffing. As defined in DoDI 4715.03, use professionally trained natural resources management personnel with a degree in the natural sciences to develop and implement the installation INRMP. (T-0). 3.11.1. Outsourcing

Federal Public Laws and Executive Orders	
	Management. As stipulated in the Sikes Act, 16 U.S.C. § 670 et. seq., the Office of Management and Budget Circular No. A-76, Performance of Commercial Activities, August 4, 1983 (Revised May 29, 2003) does not apply to the development, implementation and enforcement of INRMPs. Activities that require the exercise of discretion in making decisions regarding the management and disposition of government owned natural resources are inherently governmental. When it is not practicable to utilize DoD personnel to perform inherently governmental natural resources management duties, obtain these services from federal agencies having responsibilities for the conservation and management of natural resources.
DoD Policy, Directives, and Instructions	
DoD Instruction 4150.07 DoD Pest Management Program dated 29 May 2008	Implements policy, assigns responsibilities, and prescribes procedures for the DoD Integrated Pest Management Program.
DoD Instruction 4715.1, Environmental Security	Establishes policy for protecting, preserving, and (when required) restoring and enhancing the quality of the environment. This instruction also ensures environmental factors are integrated into DoD decision-making processes that could impact the environment, and are given appropriate consideration along with other relevant factors.
DoD Instruction (DODI) 4715.03, Natural Resources Conservation Program	Implements policy, assigns responsibility, and prescribes procedures under DoDI 4715.1 for the integrated management of natural and cultural resources on property under DoD control.
OSD Policy Memorandum – 17 May 2005 – Implementation of Sikes Act Improvement Amendments: Supplemental Guidance Concerning Leased Lands	Provides supplemental guidance for implementing the requirements of the Sikes Act in a consistent manner throughout DoD. The guidance covers lands occupied by tenants or lessees or being used by others pursuant to a permit, license, right of way, or any other form of permission. INRMPs must address the resource management on all lands for which the subject installation has real property accountability, including leased lands. Installation commanders may require tenants to accept responsibility for performing appropriate natural resource management actions as a condition of their occupancy or use, but this does not preclude the requirement to address the natural resource management needs of these lands in the installation INRMP.
OSD Policy Memorandum – 1 November 2004 – Implementation of Sikes Act Improvement Act Amendments: Supplemental Guidance Concerning INRMP Reviews	Emphasizes implementing and improving the overall INRMP coordination process. Provides policy on scope of INRMP review, and public comment on INRMP review.
OSD Policy Memorandum – 10 October 2002 – Implementation of Sikes Act Improvement Act: Updated Guidance	Provides guidance for implementing the requirements of the Sikes Act in a consistent manner throughout DoD and replaces the 21 September 1998 guidance Implementation of the Sikes Act Improvement Amendments. Emphasizes implementing and improving the overall INRMP coordination process and focuses on coordinating with stakeholders, reporting requirements and metrics, budgeting for

Federal Public Laws and Executive Orders	
	INRMP projects, using the INRMP as a substitute for critical habitat designation, supporting military training and testing needs, and facilitating the INRMP review process.
USAF Instructions and Directives	
32 CFR Part 989, as amended, and AFI 32-7061, Environmental Impact Analysis Process	Provides guidance and responsibilities in the EIAP for implementing INRMPs. Implementation of an INRMP constitutes a major federal action and therefore is subject to evaluation through an Environmental Assessment or an Environmental Impact Statement.
AFI 32-7062, Air Force Comprehensive Planning	Provides guidance and responsibilities related to the USAF comprehensive planning process on all USAF-controlled lands.
AFI 32-7064, Integrated Natural Resources Management	Implements AFPD 32-70, Environmental Quality; DODI 4715.03, Natural Resources Conservation Program; and DODI 7310.5, Accounting for Sale of Forest Products. It explains how to manage natural resources on USAF property in compliance with Federal, state, territorial, and local standards.
AFI 32-7065, Cultural Resources Management	This instruction implements AFPD 32-70 and DoDI 4710.1, Archaeological and Historic Resources Management. It explains how to manage cultural resources on USAF property in compliance with Federal, state, territorial, and local standards.
AFPD 32-70, Environmental Quality	Outlines the USAF mission to achieve and maintain environmental quality on all USAF lands by cleaning up environmental damage resulting from past activities, meeting all environmental standards applicable to present operations, planning its future activities to minimize environmental impacts, managing responsibly the irreplaceable natural and cultural resources it holds in public trust and eliminating pollution from its activities wherever possible. AFPD 32-70 also establishes policies to carry out these objectives.
Policy Memo for Implementation of Sikes Act Improvement Amendments, HQ USAF Environmental Office (USAF/ILEV) on January 29, 1999	Outlines the USAF interpretation and explanation of the Sikes Act and Improvement Act of 1997.

Appendix B. Cheyenne Mountain SFS Plant Species List

Scientific name	Common name
Abies concolor	white fir
Acer glabrum var. glabrum	Rocky Mountain maple
Acer negundo	box elder
Achillea millefolium	common yarrow
Achnatherum robustum	sleepygrass
Actaea rubra[+]	red baneberry
Ageratina herbacea	fragrant snakeroot
*Agropyron cristatum**	crested wheatgrass
Agrostis scabra	ticklegrass
*Agrostis stolonifera**	creeping bentgrass
Allium cernuum	nodding onion
*Alyssum simplex**	alyssum
Amaranthus retroflexus	redroot amaranth
Ambrosia psilostachya	western ragweed
Ambrosia trifida var. *trifida*	great ragweed
Andropogon gerardii	big bluestem
Apocynum androsaemifolium	spreading dogbane
Aquilegia chrysantha	golden columbine
Arabis drummondii	Drummond's rockcress
Aralia nudicaulis	wild sarsparilla
*Arctium minus**	common burdock
Arctostaphylos uva-ursi	kinnikinnick
Aristida purpurea	purple three-awn
Artemisia campestris	field sagewort
Artemisia dracunculus	tarragon
Artemisia frigida	fringed sagebrush
Artemisia ludoviciana	Louisiana sagewort
Artemisia ludoviciana var. *incompta*	white sagebrush
Asclepias speciosa	showy milkweed
Asclepias tuberosa ssp. *interior*	butterfly milkweed
*Asparagus officinalis**	garden asparagus
Asplenium septentrionale[+]	forked spleenwort
Astragalus agrestis	purple milkvetch
*Astragalus cicer**	chickpea milkvetch
Astragalus sparsiflorus [+]	Front Range milkvetch
Bassia scoparia	kochia/burning bush
Besseya plantaginea	White River kittentails
Bouteloua curtipendula	sideoats grama
Bouteloua gracilis	blue grama

Scientific name	Common name
Bouteloua hirsuta var. *hirsuta*	hairy grama
Bouteloua simplex	matted grama
Brickellia californica	California brickellbush
Brickellia eupatorioides	false boneset
Brickellia grandiflora	tasselflower brickellbush
Bromus arvensis	Japanese brome
*Bromus inermis**	smooth brome
Bromus lanatipes	woolly brome
*Bromus tectorum**	cheatgrass
Calochortus nuttallii	Nuttall's sego lily
Campanula rotundifolia	bluebells
*Carduus nutans**	musk thistle
Carex aurea+	golden sedge
Carex inops ssp. *heliophila*	sun sedge
Carex microptera +	small-winged sedge
Carex praticola+	meadow sedge
Castilleja integra	wholeleaf Indian paintbrush
*Centaurea diffusa**	diffuse knapweed
Centaurea stoebe ssp. *micranthos**	spotted knapweed
Cercocarpus montanus	mountain mahogany
Cheilanthes fendleri	Fendler's lip fern
Chenopodium desiccatum	aridland goosefoot
Chenopodium fremontii	Fremont's goosefoot
Chenopodium pratericola	desert goosefoot
Circaea alpina+	small enchanter's nightshade
*Cirsium arvense**	Canada thistle
*Cirsium vulgare**	bull thistle
*Clematis orientalis**	Chinese clematis
Collomia linearis+	tiny trumpet
*Convolvulus arvensis**	field bindweed
Conyza canadensis	horseweed
Cystopteris fragilis+	brittle bladder fern
*Dactylis glomerata**	orchard grass
Dalea purpurea	purple prairie clover
*Daucus carota**	Queen Anne's lace
*Descurainia sophia**	flixweed
Dodecatheon pulchellum+	shooting star
Dryopteris filix-mas+	male fern
Dyssodia papposa	fetid marigold
*Echinochloa crus-galli**	barnyard grass
*Elaeagnus angustifolia**	Russian olive

Scientific name	Common name
Elymus canadensis	Canada wildrye
Elymus elymoides	squirreltail
Elymus trachycaulus	slender wheatgrass
Epilobium ciliatum[+]	American willow-herb
Eragrostis trichodes	sand lovegrass
Ericameria nauseosa	rubber rabbitbrush
Erigeron colomexicanus	running daisy
Erigeron flagellaris	trailing daisy
Erigeron formosissimus	beautiful daisy
Erigeron strigosus var. *strigosus*	prairie fleabane
Erigeron subtrinervis	threenerve daisy
Eriogonum jamesii var. *jamesii*	James' buckwheat
*Erodium cicutarium**	redstem filaree
Erysimum capitatum	sand dune wallflower
*Euphorbia cyparissias**	Cypress spurge
Euphorbia marginata[+]	snow-on-the-mountain
Fragaria vesca	woodland strawberry
Frasera speciosa	elkweed
Galium aparine[+]	cleavers
Galium boreale	northern bedstraw
Galium triflorum[+]	fragrant bedstraw
Gentiana affinis	Bigelow's gentian
Gentiana parryi [+]	Parry's gentian
Geranium caespitosum	Rocky Mountain geranium
Grindelia squarrosa	curlycup gumweed
Hackelia floribunda[+]	manyflower stickseed
Helianthus annuus	common sunflower
Helianthus petiolaris	prairie sunflower
Heliomeris multiflora	showy goldeneye
Heliopsis helianthoides var. *scabra*[+]	smooth ox-eye
Hesperostipa comata	needle and thread
Heterotheca villosa	hairy false goldenaster
Heuchera parvifolia	common alumroot
Hieracium fendleri	yellow hawkweed
Holodiscus dumosus	oceanspray/rock spirea
Hordeum jubatum	foxtail barley
Humulus lupulus var. *neomexicanus*	New Mexican hop
Hydrophyllum fendleri var. *fendleri*	Fendler's waterleaf
Ipomopsis aggregata ssp. *collina*	scarlet gilia
Jamesia americana var. *americana*	fivepetal cliffbush
Juncus dudleyi[+]	Dudley's rush

Scientific name	Common name
Juncus ensifolius	swordleaf rush
Juniperus communis var. depressa	common juniper
Juniperus scopulorum	Rocky Mountain juniper
Koeleria macrantha	junegrass
Krascheninnikovia lanata	winterfat
*Lactuca serriola**	prickly lettuce
Lactuca tatarica var. *pulchella*	blue lettuce
*Lathyrus latifolius**	everlasting pea
Liatris punctata	dotted blazing star
*Linaria vulgaris**	yellow toadflax
Linum lewisii	Lewis flax
Lithospermum multiflorum	southwestern stoneseed/puccoon
Machaeranthera bigelovii	Bigelow's tansy-aster
Maianthemum stellatum	false Solomon's seal
*Malva neglecta**	common mallow
*Medicago lupulina**	black medick
*Medicago sativa**	alfalfa
*Melilotus officinalis**	sweet clover
Mentha arvensis	wild mint
Mentzelia nuda	white-flowered blazingstar
Mertensia lanceolata	prairie bluebells
Mirabilis hirsuta	hairy four o'clock
Mirabilis linearis	narrowleaf four o'clock
Monarda fistulosa var. *menthifolia*	wild bergamont/beebalm
Muhlenbergia montana	mountain muhly
Muhlenbergia racemosa	marsh muhly
Muhlenbergia wrightii[+]	spike muhly
Nassella viridula	green needlegrass
*Nepeta cataria**	catnip
Oenothera cespitosa	tufted evening primrose
Oenothera coronopifolia	crownleaf evening primrose
Oenothera villosa	hairy evening primrose
Oligoneuron rigidum var. *humile*	stiff goldenrod
Onopordum acanthium*	Scotch thistle
Onosmodium bejariense var. *occidentale*	western marbleseed
Opuntia macrorhiza	western prickly pear
Packera fendleri	Fendler's ragwort
Panicum capillare	witchgrass
Panicum virgatum	switchgrass
Parthenocissus vitacea	Virginia creeper/thicket creeper
Pascopyrum smithii	western wheatgrass

Scientific name	Common name
Penstemon barbatus	beardlip penstemon
Penstemon glaber+	sawsepal penstemon
Penstemon glaber var. *brandegeei*	Brandegee's penstemon
Penstemon gracilis+	lilac penstemon
Penstemon virens	Front Range beardtongue
Pericome caudata	mountain tail-leaf
Physalis hederifolia var. *comata*+	ivy-leaf ground cherry
Physalis heterophylla	clammy ground cherry
Physocarpus monogynus	mountain ninebark
Pinus edulis	pinyon pine
Pinus ponderosa var. *scopulorum*	ponderosa pine
Piptatheropsis micrantha	littleseed ricegrass
*Plantago major**	common plantain
*Poa compressa**	Canada bluegrass
*Poa pratensis**	Kentucky bluegrass
Polygonum convolvulus var. *convolvulus*	black bindweed
Populus angustifolia	narrowleaf cottonwood
Populus deltoides ssp. *monilifera*	plains cottonwood
Potentilla fissa	bigflower cinquefoil
Prunus americana	wild plum
Prunus virginiana var. *melanocarpa*	chokecherry
Pseudostellaria jamesiana+	tuber starwort
Pseudotsuga menziesii var. *glauca*	Douglas-fir
Psoralidium tenuiflorum	slimflower scurfpea
Pterospora andromedea	pinedrops
Quercus gambelii	Gambel oak
Ratibida columnifera	prairie coneflower
Rhus trilobata	skunkbush sumac
Ribes cereum	wax currant
Ribes leptanthum	trumpet gooseberry
Robinia neomexicana	New Mexico locust
Rosa arkansana	prairie rose
Rosa woodsii	smooth rose
Rubus deliciosus	delicious raspberry/Boulder raspberry
Rubus idaeus ssp. *strigosus*	red raspberry
*Rumex crispus**	curly dock
Salix amygdaloides	peach-leaf willow
Salix exigua	coyote willow/sandbar willow
*Salsola tragus**	Russian thistle/tumbleweed
Schizachyrium scoparium var. *scoparium*	little bluestem
Schoenoplectus tabernaemontani	softstem bulrush

Scientific name	Common name
Scrophularia lanceolata	lanceleaf figwort
Scutellaria brittonii	Britton's skullcap
Sedum lanceolatum	spearleaf stonecrop
Selaginella weatherbiana	Weatherby's spike-moss
Senecio spartioides	narrow-leaved butterweed
*Setaria pumila**	yellow bristlegrass
Silene antirrhina⁺	sleepy catchfly
*Sisymbrium altissimum**	tall tumblemustard
Smilax lasioneura⁺	Blue Ridge carrionflower
Solidago canadensis	Canada goldenrod
Solidago missouriensis	Missouri goldenrod
Solidago speciosa var. *pallida*	showy goldenrod
*Sonchus asper**	spiny sow-thistle
Sorghastrum nutans	Indian grass
Sphaeralcea coccinea	scarlet globemallow
Sporobolus cryptandrus	sand dropseed
Symphoricarpos albus	white snowberry
Symphoricarpos occidentalis	wolfberry
Symphyotrichum ericoides	white aster
Symphyotrichum falcatum	white prairie aster
Symphyotrichum laeve var. *geyeri*	smooth blue aster
Symphyotrichum porteri	smooth white aster
*Tamarix ramosissima**	salt-cedar
*Taraxacum officinale**	common dandelion
Thalictrum fendleri	Fendler's meadowrue
Thermopsis rhombifolia	prairie goldenbanner
*Thinopyrum intermedium**	intermediate wheatgrass
*Thinopyrum ponticum**	rush wheatgrass
Toxicodendron rydbergii	western poison ivy
Tradescantia occidentalis	prairie spiderwort
*Tragopogon dubius**	western salsify
*Trifolium repens**	white clover
Triodanis perfoliata⁺	clasping Venus' looking-glass
Typha latifolia	broadleaf cattail
*Ulmus pumila**	Siberian elm
*Verbascum thapsus**	common mullein
Verbena bracteata	prostrate vervain
Veronica anagallis-aquatica	water speedwell
Vicia americana	American vetch
*Vicia villosa**	winter vetch
Vitis riparia	river bank grape

Scientific name	Common name
Woodsia neomexicana[+]	New Mexico cliff fern
Woodsia oregana ssp. *cathcartiana*	Oregon cliff fern
Xanthium strumarium	common cocklebur
Yucca glauca	Great Plains yucca

[+]Species recorded during 1995 surveys but not found during 2017-2018 surveys.

*Non-native species. Note that weed species are subject to control efforts and may no longer be present.

Appendix C. Cheyenne Mountain SFS Wildlife Species List

Common Name	Scientific Name
Birds	
American crow	*Corvus brachyrhynchos*
American goldfinch	*Spinus tristis*
American kestrel	*Falco sparverius*
American peregrine falcon	*Falco peregrinus*
American robin	*Turdus migratorius*
Black-billed magpie	*Pica hudsonia*
Black-capped chickadee	*Poecile atricapillus*
Black-headed grosbeak	*Pheucticus melanocephalus*
Blue-gray gnatcatcher	*Polioptila caerulea*
Broad-tailed hummingbird	*Selasphorus platycercus*
Brown creeper	*Certhia americana*
Canyon wren	*Catherpes mexicanus*
Chihuahuan raven	*Corvus cryptoleucus*
Chipping sparrow	*Spizella passerina*
Clark's nutcracker	*Nucifraga columbiana*
Cliff swallow	*Petrochelidon pyrrhonota*
Common raven	*Corvus corax*
Cordilleran flycatcher	*Empidonax occidentalis*
Downy woodpecker	*Picoides pubescens*
Golden eagle	*Aquila chrysaetos*
Hairy woodpecker	*Leuconotopicus villosus*
House finch	*Carpodacus mexicanus*
House wren	*Troglodytes aedon*
Indigo bunting	*Passerina cyanea*
Lazuli bunting	*Passerina amoena*
Lesser goldfinch	*Spinus psaltria*
Mountain chickadee	*Poecile gambeli*
Mourning dove	*Zenaida macroura*
Northern flicker	*Colaptes auratus*
Ovenbird	*Seiurus aurocapillus*
Pine siskin	*Carduelis pinus*
Plumbeous vireo	*Vireo plumbeus*

Common Name	Scientific Name
Peregrine falcon	*Falco peregrinus*
Prairie falcon	*Falco mexicanus*
Pygmy nuthatch	*Sitta pygmaea*
Red-breasted nuthatch	*Sitta canadensis*
Red-tailed hawk	*Buteo jamaicensis*
Ruby-crowned kinglet	*Regulus calendula*
Rufous hummingbird	*Selasphorus rufus*
Rock pigeon	*Columbia livia*
Rock wren	*Salpinctes obsoletus*
Say's phoebe	*Sayornis saya*
Sharp-shinned hawk	*Accipiter striatus*
Spotted towhee	*Pipilo maculatus*
Steller's jay	*Cyanocitta stelleri*
Townsend’s warbler	*Setophaga townsendi*
Violet-green swallow	*Stelgidopteryx serripennis*
Virginia's warbler	*Leiothlypis virginiae*
Warbling vireo	*Vireo gilvus*
Western bluebird	*Sialia mexicana*
Western meadowlark	*Sturnella neglecta*
Western tanager	*Piranga ludoviciana*
Western wood pewee	*Contopus sordidulus*
White-breasted nuthatch	*Sitta carolinensis*
White-throated swift	*Aeronautes saxatalis*
Wild turkey	*Meleagris gallopavo*
Wilson’s warbler	*Cardellina pusilla*
Woodhouse's scrub jay	*Aphelocoma woodhouseii*
Yellow warbler	*Setophaga petechia*
Insects	
Aphrodite fritillary	*Speyeria aphrodite*
Blue-eyed darner	*Rhionaeschna multicolor*
Checkered white	*Pontia protodice*
Common wood nymph	*Cercyonis pegala*
Field crescent	*Phyciodes pulchella*
Hoary comma	*Polygonia gracilis*
Orange sulphur	*Colias eurytheme*
Orange-headed skipper	*Amblyscirtes phylace*

Common Name	Scientific Name
Painted lady	*Vanessa cardui*
Pale swallowtail	*Papilio eurymedon*
Queen Alexander's sulphur	*Colias alexandra*
Reakirt's blue	*Hemiargus isola*
Red admiral	*Vanessa atalanta*
Silver spotted skipper	*Epargyreus clarus*
Spotted pine sawyer	*Monochamus clamator*
Taxiles skipper	*Poanes taxiles*
Two-tailed swallowtail	*Papilio multicaudata*
Variegated fritillary	*Euptoieta claudia*
Western tiger swallowtail	*Papilio rutulus*
Wiedemeyer's admiral	*Limenitis weidemeyerii*
Woodland skipper	*Ochlodes sylvanoides*
Mammals	
Black bear	*Ursus americanus*
Bushy-tailed woodrat	*Neotoma cinerea*
Deer mouse	*Peromyscus maniculatus*
Gray fox	*Urocyon cinerioargenteus*
Long-tailed weasel	*Mustela frenata*
Meadow vole	*Microtus pennsylvanicus*
Mexican woodrat	*Neotoma mexicana*
Mountain lion	*Puma concolor*
Mule deer	*Odocoileus hemionus*
Striped skunk	*Mephitis mephitis*
Western harvest mouse	*Reithrodontomys megalotis*
Reptiles	
Prairie lizard	*Sceloporus undulatus*
Western rattlesnake	*Crotalus viridis*
Western terrestrial garter snake	*Thamnophis elegans*

Appendix D. USFWS National Wetlands Inventory Map for Cheyenne Mountain SFS

Appendix E. Cheyenne Mountain SFS Natural Resource Reports and Plans

1995

Argonne National Laboratory Inventory of Rare Vertebrates and Plants at Cheyenne Mountain Air Station - U.S. Air Force [Not available.]
J. Duwaldt, M. Snyder, and S. Kelso

1999

Integrated Natural Resources Management Plan, 2000-2005
U.S. Air Force, Cheyenne Mountain Air Station, Colorado Springs.

2004

Colorado Butterfly Plant Survey for Cheyenne Mountain AFS, CO
The University of New Mexico, Colorado Springs Branch
Colorado Springs, CO

2005

2005 Cheyenne Mountain Air Force Station (CMAFS) Biological Inventory Report and Recommendations
Engineering & Environment, Inc., Virginia Beach, VA.

Forest management plan (2006-2010)
Engineering & Environment, Inc., Virginia Beach, VA.

Invasive Plant Species Control Plan, Cheyenne Mountain Air Force Station, Colorado
North Wind, Inc.
Idaho Falls, ID.

Results of the 2005 Forest Pest Survey, Cheyenne Mountain Air Force Station
J. R. Applegate
Engineering & Environment, Inc., Virginia Beach, VA

Threatened and Endangered Plant Species Inventory for Cheyenne Mountain AFS, CO
New Mexico Engineering Research Institute
The University of New Mexico, Colorado Springs Branch, Colorado Springs, CO

2014

Cheyenne Mountain Air Force Station Integrated Natural Resources Management Plan, 2014
Cheyenne Mountain Air Force Station Civil Engineering Division
721st Mission Support Group, Cheyenne Mountain Air Force Station, Colorado Springs, CO

Evaluation of Douglas-fir Tussock Moth on Cheyenne Mountain, LSC-14-17
R. Powell
USDA Forest Service, Rocky Mountain Region, Lakewood Service Center, Golden, CO

n.d.

Cheyenne Mountain Air Force Station Forest Management Plan (2014-2018)
J. McDermott
Civil Engineering Division, 721st Mission Support Group, Cheyenne Mountain Air Force Station, Colorado Springs, CO

2015

Douglas-fir Tussock Moth Evaluation on Cheyenne Mountain Area
R. Powell
LSC-15-13
USDA Forest Service, Rocky Mountain Region, Lakewood Service Center, Golden, CO

2016

Evaluation of Tussock Moth Defoliation Event at Cheyenne Mountain Air Force Station
S. Stevens and R. Powell
LSC-16-10
USDA Forest Service, Rocky Mountain Region, Lakewood Service Center, Golden, CO

Invasive Plant Species Management Plan, Cheyenne Mountain Air Force Station, Colorado
Ageiss Inc.
Lakewood, CO

2017

Cheyenne Mountain Air Force Station Forest Stand Inventory, Forest Health Assessment and Management Support – Forest Management Recommendations
A. F. Hauer, P. Matson, and F. R. Hauer
Center for Integrated Research on the Environment
University of Montana, Missoula, MT

2018

Sensitive Species Survey – Cheyenne Mountain Air Force Station, 2017-2018
J. Sovell and G. Doyle
Colorado Natural Heritage Program
Colorado State University, Fort Collins

MEXICAN SPOTTED OWL SURVEY PROTOCOL

U.S. FISH AND WILDLIFE SERVICE, 2012

INTRODUCTION

The following field survey protocol is designed for detecting Mexican spotted owls (hereafter, "owl"; Strix occidentalis lucida) and for surveying areas where human activities might remove or modify owl habitat, or otherwise adversely affect the species. The owl was federally listed as threatened on March 16, 1993 (58 FR 14248). Federal agencies are not required to conduct surveys for listed species prior to preparing a biological assessment under the Endangered Species Act ["Act"; see 50 CFR 402.12(f)]. However, Federal agencies are required to provide the best scientific information available when assessing the effects of their actions to listed species and critical habitat [50 CFR 402.14(d)]. In the absence of necessary information, the U.S. Fish and Wildlife Service (FWS) gives the benefit of the doubt to the listed species [H.R. Conf. Rep. No. 697, 96th Cong., 2nd Sess. 12 (1979)].

This survey protocol expresses the FWS's scientific opinion on adequate owl survey methods and includes guidance and recommendations. It does not constitute law, rules, regulations, or absolute requirements. Our knowledge is continuously developing and changing; therefore, this protocol, which is based upon the best scientific data available, is a work in progress. This protocol will be modified as new information becomes available. The public will be notified of changes to the protocol through postings to the FWS's Arizona Ecological Services Field Office (AESO) (http://www.fws.gov/southwest/es/arizona/). We encourage submissions to us (email submissions to Shaula_Hedwall@fws.gov) at any time of any information that can add to our understanding of what is needed to provide for long-term conservation of this species and its ecosystem. Persons conducting owl surveys must be covered under a research and recovery permit under Section 10(a)(1)(A) of the Act in order to avoid unauthorized harassment of owls, which could violate the prohibitions of Section 9 of the Act. However, no other Federal permitting requirements are implied, though individual states might have their own permitting requirements. Circumstances dictate how owl surveys are implemented. If surveys cannot be accomplished pursuant to this protocol, we recommend contacting the nearest FWS Ecological Services Field Office (ESFO) for guidance on additional survey methods before proceeding.

The FWS endorses the use of this protocol for obtaining information on owl occupancy within and adjacent to proposed project areas. This protocol helps the public and agency personnel determine whether proposed activities will have an impact on owls and/or owl habitat. A properly conducted survey will help agencies determine whether or not further consultation with the FWS is necessary before proceeding with a project. Any information on owl presence within and/or adjacent to the proposed planning or activity areas is important, even if it does not meet the guidelines described below. However, if the only owl location information available for a proposed project was acquired through surveys not conducted in accordance with this protocol, the FWS may conservatively assess the impacts of the proposed management activity on owls, (e.g.) assume the species is present in or near the action area if the best available information makes such an assumption reasonable. This survey protocol is not designed for monitoring owl population trends or for research applications.

The generally accepted protocol for inventorying Mexican spotted owls was developed by the Southwestern Region of the U.S. Forest Service (FS) in 1988. The protocol was revised in 1989 and in 1990 it was appended to the Forest Service Manual. The protocol, as an element of Interim Directive No. 2, had an official duration of 18 months but has served as the guidance accepted by most agencies and individuals conducting surveys for owls on public lands throughout Arizona, New Mexico, Utah, and Colorado through 2003. The FS reissued the inventory protocol in 1994, again in 1995, and then issued the latest version in February 1996. The FS incorporated recommendations from the draft and subsequent final Recovery Plan for the Mexican Spotted Owl (USDI FWS 1995) regarding the designation of protected activity centers (PACs) around owl locations but did not modify the overall survey design.

Through application of and the use of the data gathered by the existing protocol under informal and formal consultations under Section 7 of the Act, the FWS has found instances where therefinement of the protocol would benefit both the species and those working with it. On January 26, 1998, the FWS met with a group of experts to review the FS protocol and available literature and to improve and update the document. The following draft document is the result of those discussions and subsequent review by FWS biologists and Mexican Spotted Owl Recovery Team members.

This protocol provides a FWS-endorsed method to: 1) make inferences regarding the presence or absence of owls in a defined area; 2) assess occupancy and nesting status, and locate nests, in areas where habitat alterations or disturbances to owls are likely to occur; and, 3) provide information to allow designation of PACs.

The primary objective of conducting surveys using this protocol should be to locate and observe the nest of a Mexican spotted owl or young. These observations provide the most reliable and efficient information for documenting presence and delineating potential nest core areas or roost sites (Ward and Salas 2000). Because spotted owls do not nest every year, the alternative, and often default outcome, is to observe adult or subadult spotted owls at daytime roosts. However, it can take up to four years of roost location data to effectively delineate owl core activity areas (Ward and Salas 2000). Locating a resident owl's nest or young may be accomplished most effectively using the mousing technique described in the protocol below (and see Forsman 1983). The mousing technique requires that personnel are trained in proper care and handling of live animals for research, and that, when conducting daytime follow-up surveys, they procure and carry "feeder" mice into the field (American Society of Mammalogists 1998, National Academy of Sciences 1996).

Individuals surveying for owls should meet certain training standards. Experience will be reviewed and approved during a surveyor's application for an FWS issued Section 10(a)(1)(a) recovery permit. These standards strongly encourage surveyors to have knowledge of this protocol and the ability to identify owls visually and vocally, determine sex and age of owls, imitate vocal calls of the owls if not utilizing a tape recording of the calls, and identify other local raptor species. Orienteering skills, including use of map, compass, and/or Global Positioning System (GPS) units, are essential. Surveyor safety should be of primary importance. Those surveying for owls who do not meet these training standards could "take" owls by harming or harassing them, resulting in criminal or civil penalties.

The most efficient way to locate owls is to imitate their calls (Forsman 1983). The owl is territorial and responds to imitations of its common vocalizations. Night calling is used to elicit responses from owls and locate the general areas occupied by them. Daytime follow-up visits are used to locate roosting and/or nesting owls and to further pinpoint the activity centers of individual owls. If owls are located, mice are offered to them to locate mates, nests, and young. The information collected from nighttime calling surveys and daytime follow-up surveys assist biologists and land managers to determine whether areas are occupied or unoccupied by owls and to determine the owl's reproductive status.

Throughout this protocol, all bold-faced terms are included in the glossary. Only the first use of the term is bold-faced. An outline summarizing the primary steps for implementing the protocol appear below.

1.0 Survey Design

The survey design uses designated calling routes and calling stations to locate owls. The intent of establishing calling routes and calling stations is to obtain complete coverage of the survey area so that owls will be able to hear a surveyor calling and a surveyor will be able to hear the owl(s) responding.

A. The survey area should include all areas where owls or their habitat might be affected by management actions. If an area is relatively large, it can be subdivided into manageable subunits to achieve the best survey results. In general, the survey area should include the survey area and an 800-meter (0.5-mile) area from its exterior boundaries. Within the project area, all areas that contain forested **recovery habitat**, riparian forest, and canyon habitat, or might support owls, are surveyed as defined in this revised Recovery Plan. Descriptions of owl habitat for different areas and physiographic provinces should be available from various state and Federal wildlife agencies.

Where known **protected activity centers (PACs)** exist within the survey area, calling routes can be adjusted to lessen disturbance to established PACs.

B. Owl surveyors should establish calling routes and calling stations to ensure complete coverage of the survey area. The number of calling routes and calling stations will depend upon the size of the area, topography, vegetation, and access. Calling stations should be spaced from approximately 400 meters (0.25 mile) to no more than 800 meters (0.5 mile) apart depending upon topography and background noise levels. Nighttime calling routes and calling stations should be delineated on a map, reviewed in the field, and then relocated, as necessary, to improve the survey effectiveness.

2.0 Survey Methods

Owls are usually located using nocturnal calling surveys where a surveyor imitates the territorial calls of an owl (Forsman 1983). Upon hearing a suspected intruder within their territories at night, most owls respond by calling to and/or approaching the intruder.

A. CALLING

1. Owls call during all hours of the night. However, optimal survey times include two hours following sunset and two hours prior to sunrise, and surveys should be concentrated around these periods.

2. Surveys should use nighttime surveys for all calling routes in the survey area unless safety concerns dictate that a daytime survey is necessary.

3. Calls can be imitated by the surveyor or by playing recordings of owl vocalizations. If a tape recorder is used, both the tape and tape deck used should be of high quality. Tape decks should have a minimum output of 5 watts (Forsman 1983).

4. The vocal repertoire of owls consists of a variety of hooting, barking, and whistling calls (Ganey 1990). Three call types accounted for 86 percent of calling bouts heard in Arizona: four-note location call, contact call, and bark series. The four-note call appears to be used the most frequently by owls defending a territory. It is suggested that surveyors use all three of these calls during surveys, with the four-note call as the primary call.

5. Surveyors should discontinue calling when a potential owl predator is detected, and should move on to another calling station out of earshot of the predator before resuming calling. Surveyors should return at a later time to the station(s) skipped to complete the calling route.

6. Surveyors should avoid calling for owls during periods of rain or snow, unless there is only a light misting of rain or snow that would not affect the surveyor's ability to detect owls. Surveying during inclement weather could prevent a surveyor from hearing owl responses and reduce the quality of the overall survey effort. Negative results collected under inclement weather conditions are not adequate for evaluating owl presence/absence. There is also the added risk of inducing a female owl to leave the nest during inclement weather and potentially jeopardizing nesting success.

7. Calling should not be conducted when the wind is stronger than approximately 24 km (15 miles) per hour or when the surveyor feels that the wind is limiting their ability to hear an owl. Consider using the Beaufort Wind Strength Scale. Level 4 describes winds 21 to 29 km (13 to 18 miles) per hour as a moderate breeze capable of moving thin branches, raising dust, and raising paper.

B. SURVEYS

To ensure complete coverage of the survey area, surveyors should select the best survey method for the situation and/or terrain. An owl survey might require a combination of methods, which are defined below, including: 1) calling stations; 2) continuous calling routes to obtain complete coverage of an area; and, 3) leapfrog techniques. Each of these methods is designed for nighttime calling and involves calling for owls and listening for their responses. All surveys where occupancy status is unknown should include nighttime calling.

It is imperative that, whatever method is used, surveyors actively listen during owl surveys. Owls may respond only once; therefore, surveyors must concentrate on listening at all times during surveys. In addition to active listening, surveyors should watch for owls that might be drawn in but do not respond vocally.

1. CALLING STATIONS

a. **Spacing** - Calling stations should typically be spaced approximately 400 meters (0.25 mile) to no more than 800 meters (0.5 mile) apart depending on topography and background noise. In some situations (i.e., complex topography, etc.), establishing calling stations <400 meters apart and more calling stations increases the likelihood of detecting owls. In canyon habitat, if surveying from the canyon bottom, stations should be placed at canyon intersections. If surveying canyons from the rims, calling stations at points and canyon heads should be included.

b. **Timing** - Surveyors should spend at least 15 minutes at each calling station: 10 minutes calling and listening in an alternating fashion, and the last 5 minutes listening. Owl response time varies, most likely because of individual behavior. Some owls will respond immediately, some respond following a delay, and some do not respond. In canyon habitat, it is recommended that surveyors spend a minimum of 20 minutes (30 minutes, if possible) at each station.

c. **Visitation** - Vary the sequence of visitation to calling stations, if possible, during subsequent visits to the area. For example, the order of the calling stations can be reversed. Varying the order of calling stations avoids potential bias related to time of night or other factors.

d. **Intermediate calling stations** should be used when factors decrease the probability of achieving complete coverage using the originally designated stations, or as triangulation points for determining nighttime owl locations. Use of intermediate calling stations can increase the likelihood of detecting owls and, thus, allow for stronger inference regarding the absence of an owl within the area.

2. CONTINUOUS CALLING METHOD

In some cases, using continuous calling is appropriate. Continuous calling involves imitating owl calls at irregular intervals while walking slowly along a route and stopping regularly to listen for owl responses. Because of the sounds produced by walking (e.g., snapping twigs, pinecones, etc.), surveyors utilizing this calling method must concentrate on active listening. In canyon habitat, the continuous calling method is only recommended when combined with calling stations.

a. The surveyor should walk slowly (5 km per hour [3.3 miles per hour]) so as to minimize the possibility that an owl responds after surveyors are out of hearing range (i.e., allow time for owls to respond).

b. The surveyor must stop regularly (400 meters [0.25 mile]) along the route to listen for owl responses.

3. LEAPFROG METHOD

The leapfrog method is very useful when roads allow for coverage of all or a portion of the survey area. This method requires two people and a vehicle.

a. One surveyor is dropped off and begins calling while the other person drives the vehicle ahead at least 800 meters (0.5 mile). The second person then leaves the vehicle for the first person and proceeds ahead while calling.

b. Each surveyor should follow the continuous calling method. The first person continuously calls as he or she walks towards the vehicle, drives the truck at least 800 meters (0.5 mile) past the second person (i.e., “leapfrogs”), leaves the vehicle there and resumes calling along the survey route.

c. Surveyors should repeat this procedure until complete coverage of the survey area is accomplished.

3.0 Number and Timing of Surveys

Owl detection rates change with season, owl activity, and habitat. Ganey (1990) found that calling activity was highest during the nesting season (March-June). Information from past survey efforts indicate that owl response can also vary with habitat type and/or reproductive chronology (Fig. D.1). Generally, late March through late June is the optimal time period to detect owls. Surveys conducted during March-June will increase the likelihood of detecting owls. Additionally, if owls are not detected when surveys are conducted properly and at these peak times, then inferences about absence of owls in a given area will be stronger. It should be noted that responses in September can be used only to document presence. Surveys in September are not reliable for locating nests, delineating PACS, and/or inferring absence.

Specific criteria on number and timing of surveys are used to determine whether a **complete inventory** has been accomplished. A complete inventory requires that at least four properly scheduled complete surveys be accomplished annually for two years. Additional years of surveys strengthen any inferences made in cases where owls are not detected. If habitat modifying or potentially disruptive activities are scheduled for a particular year, the second year of surveys should be conducted either the year before or the year of (but prior to) project implementation. In other words, projects should occur as soon as possible after completion of surveys to minimize the likelihood that owls will be present during implementation. If more than five years have elapsed between the last survey year and the initiation of the proposed action, then one additional year of survey is recommended prior to project implementation.

A. In compliance with the guidelines in B through G below, surveyors should conduct four **complete surveys** during each breeding season. A complete survey can be a combination of a pre-call (daytime reconnaissance of habitat to be night called), a nighttime calling survey, and, if owls are detected, a **daytime follow-up survey**. If owls are not detected during daytime calling, night calling must be completed. However, if owls are located during a precall, night calling of the survey area is not required. Surveyors might want to conduct additional surveys if there is evidence that additional owls remain undetected in the area.

B. The four complete surveys must be spread out over the breeding season (1 March - 31 August) by following one of three recommended scheduling scenarios:

1. Conducting two to four surveys during 1 March - 30 June, with no more than one survey in March. Owl calling activity tends to increase from March through May (Ganey 1990), so this time period is optimal for locating owls.

2. Completing all surveys by 31 August, with no more than one of the four required surveys conducted during each of the months of July and August. Owl response rates tend to decrease by July (Ganey 1990). By September, juveniles have usually dispersed and adults are not necessarily on their territories. If additional surveys are added (e.g., more than the recommended four surveys), more than one complete survey could be completed in August.

3. Allowing at least five full days between surveys. For example, assume a visit ends on 30 April. Using a proper five-day spacing (1-5 May), the next possible survey date would be 6 May (see section 3.D below for an exception to this rule).

C. A complete survey of the area should be conducted within seven consecutive days. If the area is too large to be surveyed in seven consecutive days, it should be divided into smaller subunits based on available owl habitat, topography, and other important factors.

D. In remote areas, surveyors can conduct two complete surveys during one trip into the area, so long as surveyors allow a minimum of two days between complete surveys. Conduct all field outings required for a complete survey prior to repeating any route for the second survey. Wait a minimum of 10 days before starting the next two surveys. **Areas defined as remote should be cleared with the FWS prior to proceeding with this deviation from the survey protocol**.

E. The two- to three-hour periods following sunset and preceding sunrise are the peak owl calling periods and the best times to locate owls in or near day roosts or nests.

F. Surveys can be discontinued in a given area when data indicate that the entire survey area is designated as PACs.

G. Vocal or visual locations of owls outside the breeding season (1 September - 28 February) as extra information can be of assistance in locating nesting owls in the upcoming breeding season.

4.0 Methods After Detecting a Mexican Spotted Owl

Once an owl has been detected, the following should be done:

A. Record the time the owl(s) was first detected, the type(s) of call(s) heard (if any), the owl's sex, and whether **juveniles** were detected.

B. Record a compass bearing from the surveyor's location to the location where the owl was heard and/or visually observed. If possible, triangulate the owl's location, taking compass bearings from three or more locations and estimate the distance to the owl. Record both the location where the owl responded from and the surveyor's calling location and triangulation locations on a map or photo attached to the survey form. The surveyor should know her/his location at all times. Triangulating provides an accurate means to map the owl's location. Attempt to confirm the presence of the owl(s) with a daytime follow-up visit (see section 5 below). Daytime owl locations, particularly of nests and young of the year, are very important in determining activity centers.

C. If the owl is heard clearly, and the call type and direction are confirmed, there is no need to continue calling. If, however, there is some doubt as to whether a response was detected, or from which direction, the surveyor should listen carefully for a few minutes, as an owl may call again if given the opportunity. If the owl does not respond after two to five minutes, the surveyor should continue calling to confirm owl presence and better assess the direction of the call. Do not call any more than is necessary. By stimulating the owl(s) to move you may harass a female owl off a nest or increase an owl's risk of predation.

D. Owls may move before or after they begin calling. Every effort should be made to estimate the location of the owl when the first response was heard. After you have determined the owl's location (see section 4.B above), move approximately 800 to 1,200 meters (0.5 to 0.75 mile) away (depending

upon topography) before continuing surveys to avoid response by the same owl. If the owl responds from the original detection area, then move farther away before continuing to call.

E. Record the approximate location (bearing and distance), sex, age, and species of all other raptors heard in the survey area.

F. Conduct a daytime follow-up survey as soon as possible (see section 5 below).

5. Conducting Daytime Follow-up Surveys

As with nighttime surveys, follow-up daytime searches ensure quality of results and standardization of effort. Calling to elicit territorial responses is also used during daytime follow-up visits. A daytime follow-up survey helps locate owl roosts, nest sites, and young of the year (during 1 Jun - 1 Aug) by conducting an intensive search within the general vicinity of the original night response location. Owls tend to be more active in the early morning and late evening. During the day, owls are sleepy and do not always readily respond to calling, especially on warm days. Therefore, it is critical that surveyors conduct a thorough daytime search of the response area. Surveyors should spend enough time within the response area to cover all habitats within at least an 800-meter (0.5 mile) radius of the response location. This involves walking throughout the area, calling, listening, and watching for owl sign (e.g., whitewash, pellets, etc.). The FWS recommends that a minimum of one hour be spent searching for owls (regardless of the number of people surveying).

A. Complete a daytime follow-up survey as soon as possible, but within a maximum of 48 hours after owls are detected during nighttime surveys. The optimum daytime follow-up time is the morning following the nighttime detection. In general, the longer the time delay between the nighttime response and daytime follow-up survey, the smaller the probability of locating the bird and finding its roost or nest location. This is especially true if the owl(s) are not nesting. If the daytime follow-up survey is performed longer than 48 hours after the nighttime detection and no owls are found, the survey is considered incomplete and the survey must be re-done.

B. Conduct daytime follow-up surveys in the early morning or late afternoon/early evening. The optimal dawn period is 0.5 hour before sunrise to two hours after sunrise and the optimal dusk period is two hours prior to sunset; each daytime follow-up visit should include one of these time periods. Investing time in searching for the owl during these times will provide a more reliable inference of absence in the case where the owl cannot be located. For areas where spotted owls have been observed during the daytime during previous years, an initial survey in late April through mid-May can often elicit a response. However, non-responses are not that meaningful in documenting absence without nighttime surveys because owls could have moved to another nesting or roosting grove. Initial daytime surveys can be an efficient way to start each survey season where owls have been found in the past. If the initial daytime survey is unsuccessful (i.e., no response is heard), then nighttime surveys should be used to locate owls before attempting additional daytime surveys.

C. The search area for a daytime follow-up survey is a specific, smaller area within the broader survey area in which an owl was detected.

1. Minimum search area is all recovery habitat within at least an 800-meter (0.5-mile) radius of a nighttime owl response.

2. The search area should center on the location of the owl or owls that were heard during the nighttime survey. If there is some uncertainty, focus the search on the best nesting and roosting habitats (e.g. see Ward and Salas 2000).

3. Aerial photos and maps of the area should be studied to identify habitat patches and topographic features, such as canyons or drainages, to prioritize daytime survey locations. In forested areas, spotted owls often roost in first- and second-order tributaries (Ward and Salas 2000).

D. To conduct a thorough search for owls, the surveyor should systematically walk and call all forested recovery, riparian forest, and canyon habitats within the search area. As with nighttime surveys, be aware that owls often fly into the area to investigate; thus, surveyors must also attentively watch for owls. Surveyors should also search for signs of owls such as pellets, white wash, or molted feathers. However, pellets and whitewash alone are not sufficient to document owls. Mobbing jays or other birds can also be a sign that an owl is present.

E. If a daytime follow-up visit is not completed for any reason, or the search effort was not thorough because of the presence of predators or weather, a second follow-up visit should be conducted as soon as possible.

F. If no owl(s) are located during complete daytime follow-up visits, the surveyor should return to conduct nighttime surveys. Four complete surveys to an area are recommended by the survey protocol, but surveyors should assess the confidence of the nighttime and daytime responses and determine if additional nighttime surveys are needed to more accurately determine the location of the responding owl(s). Field personnel conducting surveys need to be given the flexibility to return as many times as necessary to find the owl(s).

G. As with nighttime surveys, daytime follow-up surveys should not be conducted in inclement weather and surveyors should avoid calling when potential owl predators are present.

H. Surveyors should minimize the amount of incidental disturbance to owls. For example, surveyors must not linger in nest sites or over-call in an area.

6. Methods If Mexican Spotted Owls Are Located on a Daytime Follow-up Visit

Mousing is the primary tool to locate an owl's mate, young, and/or nest. Mousing entails feeding live mice to adult/subadult owl(s) and observing the owl’s subsequent behavior. Surveyors should be prepared to offer four mice (one at a time) to at least one member of the pair or to a single owl located on the daytime follow-up visit. For surveyors to draw conclusions about reproductive status, the owl must take at least two mice before refusing them. A mouse is considered “refused” if, after 30 minutes, it has not been taken by an owl.

If an owl takes a mouse and flies away, the surveyor should follow it as closely as possible to determine where it takes the mouse. If the surveyor is unable to follow the owl, and doesn’t know if it took the mouse to a mate, nest, or fledged young, then the fate of that mouse cannot be counted toward the four-mouse minimum described above. Surveyors should be ready to rapidly pursue owls that take mice, as owls sometimes fly several hundred meters with mice to reach their nests or young. It is not necessary to complete the four mice minimum after a mouse has unequivocally been taken to a nest.

Owl pairs are determined to be non-nesting if a single owl eats and/or caches all four mice or eats and/or caches two mice and refuses to take a third. A mouse is cached when the owl puts the mouse in a tree or on the ground and then leaves the mouse or the owl perches with the mouse for at least one hour and gives no sign of further activity. Do not feed any more mice than necessary to determine pair status, nest location, and/or reproductive status (i.e., if all observed juveniles have received a mouse then number of young produced is determined and there is no need to continue mousing). Dropped mice or mice whose fates are unknown do not count toward the total of four mice needed to complete the protocol.

Ancillary notes on an owl's behavior during the mousing attempts are also very important to record. These observations can help clarify situations in which incomplete information was collected. For example, if a male is given a mouse and begins to make single-note contact calls while looking in a specific direction in April-June, that is often a good clue that a mate, nest, and/or young may be present. Sometimes observers are too close to other owls or the nest for the "true" mouse fate to be observed. Such observations should trigger another daytime follow-up to secure the location of a mate, nest, or young of the year. For these types of additional follow-up surveys, nighttime calling is usually not necessary.

7. Determining Status from Nighttime Surveys and Daytime Follow-up Visits

A. "Pair status" is established by any of the following:

1. A male and female owl are heard and/or observed in proximity (500 meters or 0.31 mile apart) to each other on the same visit.

2. A male takes a mouse to a female (see section 6 mousing guidelines).

3. A female is observed or heard on a nest.

4. One or both adults are observed with young.

5. At least one young of the year is observed.

B. "Single status" is inferred from:

1. A daytime observation on a single occasion or nighttime responses of a single owl within the same general area (within 500 meters or 0.31 mile) on two or more occasions, with no response by an owl of the opposite sex after two complete inventories (two years of survey); or

2. Multiple responses over several years from a bird of the same sex (i.e., two responses in first year of surveys and one response in the second year of surveys, from the same general area).

Determining if the responses occur within the same general area should be based on topography and the location of any other known owls in the surrounding area.

C. "Two birds, pair status unknown" is inferred from:

The presence or response of two owls of the opposite sex where pair status cannot be determined.

D. "Status unknown" is inferred by:

The response of a male and/or female spotted owl that does not meet any of the above criteria. We recommend additional years of survey if this is the site status following a complete inventory ofthe site.

E. “Absence” is inferred:

If a complete inventory has been conducted according to this protocol, or an alternative protocol approved by the FWS, and no owls are heard. However, absence does not necessarily indicate that owls never occupy the area.

F. Separate territories are inferred by:

When two responses are recorded from owls that are more than 800 meters (0.5 mile) apart.

These responses should be considered from individuals in separate territories unless daytime follow-up visits indicate otherwise. Ideally, surveyors on two or more crews should coordinate efforts to begin calling simultaneously near each suspected activity area to rule out the existence of multiple territories. If more than one survey crew elicits responses from owls of the same sex at roughly the same time, then two or more territories probably exist.

However, if responses vary from those above, the results are considered inconclusive and additional attempts to determine status should continue. Keep in mind that some spotted owls shift their use of an area after failing to nest in a given season. Hence, responses heard in July that are 800 meters (0.5 mile) from a pair that was nesting in April or early May could be from the same individuals.

8.0 Determining Nesting Status and Reproductive Success

Determining reproductive success is not required if breeding season restrictions that protect owl reproduction are applied to all management projects in any given year. However, reproduction surveys are always valuable as they can provide information on nest tree locations, which provide the best data for determining 100-acre core areas (Ward and Salas 2000) and delineating PAC boundaries as recommended in the revised Recovery Plan. If the exact location of the nest is not determined, but juveniles are seen prior to August, the area where the juveniles are seen can be referenced as the nest stand. There are two stages of reproduction surveys: nesting status and reproductive success.

A. Determining Nesting Status:

1. Nesting-status surveys should be conducted between 1 April and 1 June. The start date is based on nesting initiation dates. Young identified after 1 June would still confirm that nesting occurred but would not allow identification of the exact location of the nest. However, young observed prior to August are usually within 400 meters (0.2 miles) of the nest of that year (Ward and Salas 2000) and this information can be useful in delineating a 100-acre nest buffer.

2. Mousing should be used to determine nesting status. The site is classified as nesting, non-nesting, or unknown nesting status based on the surveyor’s observations.

3. Two observations at least one week apart are necessary to determine nesting status if the first observation occurs before 1 May. This is necessary because the owls may show signs of initiating nesting early in the season without actually laying eggs and their behavior could be

mistaken for nesting behavior. After 1 May, a single observation of nesting behavior is sufficient.

4. The owls are classified as nesting if, on two visits prior to 1 May, or one visit after 1

May:

a. The female is seen on the nest;

b. Either the male or female member of a pair carries a mouse to a nest; or

c. Young-of-the-year are detected.

5. The owls will be classified as non-nesting if any of the following behaviors are observed.

Two observations, minimum three weeks apart, are required during the nest survey period

(1 April - 1 June) in order to infer non-nesting status. Because nesting attempts might fail before surveys are conducted, the non-nesting status includes owls that did not attempt to nest as well as those that had a failed nesting attempt. Non-nesting status is inferred during a daytime follow-up visit if:

a. The female is observed roosting for a full 60 minutes (1-30 April) during the time she should be on a nest. The female should not be in an agitated state and should be given every opportunity to return to the nest. Surveyors should attempt to mouse the female.

b. The surveyor offers prey to one or both members of the pair and they cache the prey, sit with the prey for an extended period of time (30-60 minutes), or refuse to take additional prey beyond the minimum of two prey items. To be considered a valid nesting survey, one owl must take at least two prey items.

c. All pairs considered to be non-nesting should receive at least one daytime follow-up visit between 15 May and 15 July to confirm that no young were produced.

6. Nesting status is unknown if:

a. Owls are found after 1 June without young-of-the-year; or

b. No adult or young owls are found after 1 June at those sites where adult owls were present prior to 1 June.

B. Determining Reproductive Status:

1. Once a pair is classified as nesting, reproductive success surveys should be conducted after the time the young-of-the-year leave the nest (fledge), usually in early to mid-June. For pairs whose nesting status was not determined, reproductive success surveys should be conducted between 15 May and 15 July.

2. At least two visits to the site spaced at least one week apart should be conducted to locate and count fledged young, and the timing of the visits should be scheduled so that the fledged young are observed as soon after leaving the nest as possible.

3. Visual searches and/or mousing should be used to determine reproductive success. The mousing protocol is the same as for determining non-nesting. If young are present, the adults

should take at least some of the prey to the young. The sight of an adult with prey can stimulate the young to beg, revealing their number and location.

4. If the owls take at least two prey items and eventually cache, sit with, or refuse further prey without ever taking prey to fledged young during the proper time period and no other indicative behaviors like contact calls or searching are observed, then zero young are recorded. If one individual adult or subadult owl takes and eats four mice on one visit during the proper time period, then zero young are recorded. If, however, other behaviors indicate young may be in the area, another follow-up survey is recommended to verify that zero young were produced, particularly if the pair had been observed nesting earlier that year.

9.0 Annual Reporting

An annual report of the activities conducted (including field data forms, if appropriate) should be submitted to the FWS Permits Office in Albuquerque, New Mexico, as well as the appropriate state FWS ESFO. If applicable, hard copies of any unpublished or published reports generated by the study and other data that would be useful for the conservation or recovery of the owl should be submitted to the appropriate FWS ESFO(s).

10.0 Disposition of Dead, Injured, or Sick Mexican Spotted Owls

Upon locating a dead, injured, or sick owl, initial notification should be made to the FWS's Law Enforcement Office in Arizona (telephone: 480-967-7900), Colorado (telephone: 303-274-3560), New Mexico (telephone: 505-346-7828), or Utah (telephone: 801-625-5570) within two working days (48 hours) of its finding. Written notification should be made within five calendar days and should include information on when (date, time) and where (exact location) the owl was found, photographs of the owl and/or area, if possible, and any other pertinent information. The notification should be sent to the Law Enforcement Office with a copy to the appropriate FWS ESFO. Sick and injured owls should be transported by an authorized biologist to a licensed and permitted wildlife rehabilitator or veterinarian, and care must be taken during handling to ensure effective treatment. Should the treated owl(s) survive, the FWS should be contacted regarding the final disposition of the animal. Salvaged specimens or owls that did not survive rehabilitation should be handled with care to preserve the biological material, and the remains of intact owl(s) should be provided to the appropriate FWS ESFO (as noted in the Section 10 permit). If the remains of the owl(s) are not intact or are not collected, the information noted above should be obtained.

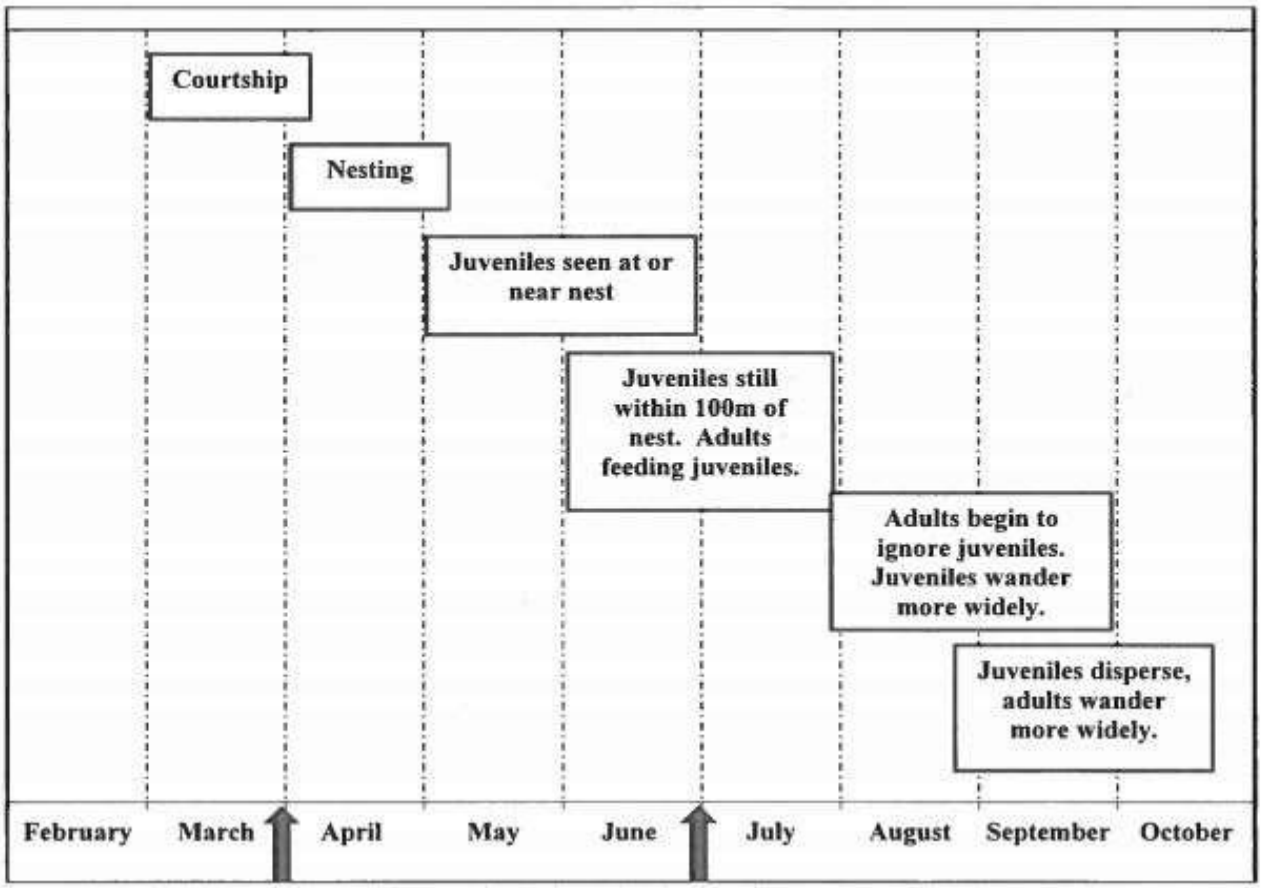

Figure D.1. Generalized reproductive chronology for the arrows at the bottom of the table indicates periods of high probability of detecting owls vary slightly with area, elevation, and/or in response to weather.

11.0 GLOSSARY, SURVEY PROTOCOL

Absence — Absence of Mexican spotted owls can be inferred when no response is recorded after a complete inventory has been completed in a defined area. Absence does not necessarily indicate that Mexican spotted owls do not or never occupy the area.

Adult — A Mexican spotted owl 3 years old. Tips of retrices (tail feathers) will be rounded with white and mottled color. Subadults will have triangular all white tips on tail feathers. For more information on identifying adult and first and second-year subadult Mexican spotted owls, see Moen et al. (1991).

Breeding Season — The time period from 1 March through 31 August that includes courtship, nesting, and nestling- and fledgling-dependency periods. This is the period of time in which surveys should be conducted. This time period will vary by geographic locale.

Calling Route — An established route within a survey area where vocal imitations or recorded calls of Mexican spotted owls are used to elicit a response.

Calling Stations — Point locations used to conduct surveys, distributed throughout an area so as to attain complete coverage of the survey area.

Complete Coverage — Complete coverage is obtained when the calling stations have been located within a survey area so that a Mexican spotted owl anywhere in the survey area would be able to hear surveyors and vice-versa.

Complete Inventory — When the following are met: 1) four complete surveys have been conducted in one year; 2) consecutive surveys have been conducted a minimum of five days apart; 3) no more than one survey has been conducted in March; 4) a minimum of two surveys have been conducted by 30 June; 5) all surveys were completed by 31 August, with no more than one survey conducted in the months of July and August; and, 6) two years of survey have been completed.

Complete Survey — A survey is complete when all calling stations or calling routes within a survey area are called within a seven-day period, including daytime follow- up visits for all Mexican spotted owl responses. If every reasonable effort has been made to cover the survey area in one outing but this is not accomplished, then additional outings will be scheduled to cover the remaining area. The entire survey area must be covered within seven consecutive days in order to be considered one complete survey. Although adverse weather conditions may present problems, an effort should be made to complete survey visits on consecutive days. If the survey area is too large to be completely surveyed in seven days, it may be divided into smaller areas based on available habitat, topography, drainages, etc.

Core Area — A 40-ha (100-acre) area within designated protected activity centers (PACs) circumscribed around the nest site. The nest area should include habitat that resembles the structural and floristic characteristics of the nest site. These

	100-acre areas will be deferred from mechanical treatment. For additional details on delineation, see Ward and Salas (2000).
Daytime Follow-up Visit	A daytime follow-up visit is conducted around Mexican spotted owl responses. The objective of a daytime follow-up visit is to locate Mexican spotted owl(s), their nests and their young by conducting an intensive search within an 800-meter (0.5-mile) radius of the original nighttime or last known response location. The follow-up visit is conducted during daylight hours and should be completed as soon as possible following the initial detection, but no later than 48 hours after detection. If Mexican spotted owls are located during the daytime follow-up visit, the surveyors use the mousing technique to determine nesting and reproductive status.
Intermediate Calling Stations	Calling locations between identified calling stations or routes used to triangulate a Mexican spotted owl's location or used to improve calling coverage of an area when weather or other conditions require. These stations are not required to be established prior to the field outing in which they are used.
Juvenile	A Mexican spotted owl is considered a juvenile in its first five months after hatching. Juveniles one to three months old are very white and have downy plumage over all of the body or evident on breast and head; at four to five months old, juveniles begin losing downy plumage but retain white triangular tips on their tail feathers (Moen et al. 1991).
Mousing	Mousing is a term used to describe the act of offering prey items to owls or other birds of prey. The purpose of mousing Mexican spotted owls is to find mates and determine the reproductive status of the owl(s) (i.e., pair, nesting, non-nesting). In some instances, a male Mexican spotted owl will take a prey item to an unseen female or an adult owl will take prey items to unseen young.
Nest	Mexican spotted owls use broken-topped trees, old raptor nests, witches brooms, caves, cliff ledges, and tree cavities for nests. A Mexican spotted owl must be observed using the structure in order to designate a nest site.
Nest Stand	An area of vegetation that contains a Mexican spotted owl nest.
Nestling	A young owl that is still in the nest; may also be called a hatchling.
Predator	Potential predators of Mexican spotted owl eggs and young include the following: great-horned owl (Bubo virginianus), northern goshawk (Accipiter gentilis), red-tailed hawk (Buteo jamaicensis), golden eagle (Aquila chrysaetos), common ravens (Corvus corax) and procyonid mammals (e.g., coati [Nasua nasua] and ringtail [Bassariscus astutus]).
Protected Activity Center (PAC)	An area of at least 243 ha (600 acres) surrounding the "activity center," which is the nest site, a roost grove commonly used during the breeding season in

absence of a verified nest site, or the best roosting/nesting habitat if both nesting and roosting information are lacking. The 243 ha (600 acres) (minimum size) is delineated around the activity center using boundaries of known habitat polygons and/or topographic boundaries, such as ridgelines, as appropriate. The boundary should enclose the best possible Mexican spotted owl habitat, configured into as compact a unit as possible, with the nest or activity center located near the center. This should include as much roost/nest habitat as is reasonable, supplemented by foraging habitat where appropriate. For example, in a canyon containing mixed-conifer on north-facing slopes and ponderosa pine on south-facing slopes, it may be more desirable to include some of the south-facing slopes as foraging habitat than to attempt to include 600 acres of north-slope habitat. In many canyon situations, oval PACs may make more sense than, for example, circular PACs; but oval PACs could still include opposing canyon slopes as described above. All PACs should be retained until this subspecies is delisted, even if Mexican spotted owls are not located there in subsequent years.

Remote Area — Generally, any survey area that requires more than four hours of travel time by vehicle and/or foot during good road, trail, and weather conditions (good for the road or trail in question) to reach. All remote areas should be agreed upon by the FWS on a case-by-case basis prior to using the survey protocol to clear a project.

Recovery Habitat — Mixed-conifer and pine-oak forest types, and riparian forests as described in this revised Recovery Plan. Recovery nest/roost habitat either is currently or has the potential to develop into nest/roost habitat. Recovery foraging/non-breeding habitat currently does or could provide habitat for foraging, dispersing, or wintering life history needs. Specific guidelines for management activities and developing recovery nest/roost conditions are specified in this revised Recovery Plan.

Roost — Tree, cliff ledge, rock, or log used by a Mexican spotted owl for extended daytime rest periods. A roost site consists of the roost itself and the immediate vicinity. Roost areas are identified by observations of the Mexican spotted owls and/or the presence of pellets, whitewash, and other evidence.

Subadult — Mexican spotted owls in their second and third summers. Identified by characteristic tail feathers with white tips tapering to sharp points (i.e., triangular shaped). For more information on identifying subadult Mexican spotted owls, please see Moen et al. (1991).

12.0 LITERATURE CITED - SURVEY PROTOCOL

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Franklin, A.B. 1992. Population regulation in northern spotted owls: theoretical implications for management Pgs. 815-827 in D.R. McCullough and R.H. Barrett, eds. Wildlife 2001: populations. El Sevier Applied Sciences, London, England.

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Ward, J. P., Jr., and D. Salas. 2000. Adequacy of roost locations for defining buffers around Mexican spotted owl nests. Wildlife Society Bulletin 28:688-698.

13.0 SUGGESTED READING – SURVEY PROTOCOL

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USDI Fish and Wildlife Service. 1993. Final rule to list the Mexican spotted owl as threatened. Federal Register 14248. Albuquerque, New Mexico, USA.

USDI Fish and Wildlife Service. 1995. Recovery plan for the Mexican spotted owl: volume I. Albuquerque, New Mexico, USA. 172 p.

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Zwank, P.J., K.W. Kroel, D.M. Levin, G.M. Southward, and R.C. Romme. 1994. Habitat characteristics of Mexican spotted owls in southwestern New Mexico. Journal of Field Ornithology 65:324-334.

14.0 Mexican Spotted Owl Survey Protocol Outline

Complete Inventory — Four complete surveys each year (minimum five days apart)
No more than one survey in March
Minimum of two surveys prior to June 30th
No more than one survey in each of July and August
All surveys completed by 31 August
Two years of complete surveys

1. Owl(s) Detected, go to 3

2. No Owls Detected, Absence inferred for survey area

3. PRESENCE - Conduct a daytime follow-up visit

A. No owl(s) found on daytime follow-up visit:

Status unknown, SINGLE STATUS inferred, return to night calling

B. Single owl located on daytime follow-up visit:

Feed maximum 4 mice to owl to determine status; if no other owl located, RESIDENT SINGLE CONFIRMED

C. Pair of owls located on daytime follow-up visit:

PAIR CONFIRMED for site, go to 4B

4. NESTING STATUS SURVEYS (1 April - 1 June)

A. Pair not detected, non-nesting, non-reproduction inferred (for that survey)

B. Pair located, mouse owls (1 of owl pair fed 4 mice)

1. If one of the following occurs, nesting confirmed, reproduction unknown, go to 5B:

a. Female on nest

b. Owl takes prey to nest

c. Young in nest with adult present

2. If one of the following occurs, non-nesting inferred, non reproduction inferred (two visits to infer non-nesting, minimum three weeks apart):

a. One of owl pair fed four mice (know fate of all four mice)

b. Female refuses mouse and/or roosts for minimum one hour (1 April - 30 April)

3. Pair (but no young) located after 1 June:

a. NESTING STATUS UNKNOWN

b. Conduct reproductive visit, go to 5A

5. REPRODUCTIVE SUCCESS VISITS

A. NESTING STATUS UNKNOWN

1. Recommend two visits, one week apart, feed four mice to locate juveniles

B. NESTING STATUS KNOWN

1. One visit to look for juveniles (this may take more than one visit to locate all juveniles produced)

2. If surveyor does not find juveniles, mouse adults to locate juveniles

Appendix G. Plant Species Suitable for Cheyenne Mountain SFS's Soils and Elevational Range

Grass Species		
Common Name	**Scientific Name**	**Mixture Percentage**
Arizona fescue	*Festuca arizonica*	20
Mountain muhly	*Muhlenbergia montana*	20
Mountain brome	*Bromus marginatus*	20
Slender wheatgrass	*Elymus trachycaulus*	20
Streambank wheatgrass	*Elymus lanceolatus*	20

Shrubs	
Common Name	**Scientific Name**
Chokecherry	*Padus virginiana*
Mountain-mahogany	*Cercocarpus montanus*
Serviceberry	*Amelanchier alnifolia*
Wild rose	*Rosa woodsii*

Trees	
Common Name	**Scientific Name**
Ponderosa pine	*Pinus ponderosa*
Douglas-fir	*Pseudotsuga menziesii*
Colorado blue spruce	*Picea pungens*
Rocky Mountain juniper	*Juniperus communis*

2.9 Natural Resources

A. Contractors shall remain in compliance with all Federal, State, local, DoD, Air Force (AFMAN 32-7033), and CMSFS requirements. All pesticides/herbicides used on site must be approved by CE HazMart. All pesticides/herbicides used must appear on the Armed Forces Pest Management Board (AFPMB) Standard List. Ensure the El Paso County Noxious Weed Management List is used to determine primary herbicide application type. Both the AFPMB & El Paso County Noxious Weed Management List are available from CE Environmental. All pesticides/herbicides must be applied by a Colorado Licensed Applicator. All state certifications must be provided to CE Environmental.

B. For projects disturbing native soil layers, and where landscaping will be required to re-vegetate; the Contractor shall ensure any fill materials utilized are certified weed-free soils, and only native ground cover species are used for landscaping and re-seeding of all disturbed areas. The following mix of native grass seed types is acceptable for re-vegetation taskings at CMSFS:

Grass Mix for Re-seeding

721 CES/CEI CHEYENNE MOUNTAIN SFS VERSION 7, 16 August 2016

Species (variety)	PLS Rate per Acre (broadcast seeding)
Arizona fescue, *Festuca arizonica*	30
Mountain muh y, *Muhlenbergia montana*	20
Pine dropseed *Blepharoneuron tricholepis*	5
Western wheatgrass, *Pascopyrum smithii*	20
Bottlebrush squirreltail, *Elymus elymoides*	10
Thickspike wheatgrass, *Elymus lanceolatus lanceolatus*	15

Native seed mix vendors may be found at the following (the provision of the following list in no way endorses any one vendor over any other, and the list is not to be considered all-inclusive):

1. Arkansas Valley Seed, Denver, CO, (877) 907-3337
2. Granite Seed, Welby, CO, 888-577-5650
3. Pawnee Buttes Seed, Greeley, CO, 800-782-594
4. Sharp Brothers Seed, Greeley, CO, (970) 356-4710
5. Western Native Seed, Coaldale, CO, (719) 942-3935

D. Any projects or requests for cutting, thinning or replanting of trees shall be coordinated with Environmental Office to ensure the Contractor will not disturb any protected species or habitat. For projects which will require the cutting, thinning or removal of forest trees, ensure that disturbed areas are re-seeded with a native grass mix as stated above. All forest trees cut/removed during projects are the property of the Space Force, and shall be de-limbed and delivered to the fenced in area east of Building 304 for permitted firewood use. Cut trees ground flush, leaving no stumps, if stump removal is required, both stumps and root ball will be disposed of via the contractor. Contact Environmental office prior to cutting project trees for cordage estimate. Contractor will have the option to buy field wood for $12 per cord for all project cut trees by leaving a check made out to US Treasury with Environmental Office. The contractor will be responsible for off base disposal of all project limbs prior to completion of project. The number and type of forest trees removed per project must be reported to Environmental-Natural Resources Manager.

   For projects that will require the removal of urban trees (decorative trees near buildings) replanting must take place on a one-for-one basis to match species type and size to the limit of 10 feet in height. If replanting the removed tree, all feasible measures should be taken to ensure survivability of the tree. All replanted or restocked trees must remain viable through completion of project.

   Transplanted pines are a prime target for the Ips (engraver) beetle, which are attracted to environmentally stressed trees. Landscape planted spruce are highly susceptible to the white pine weevil which can cause significant damage to the tree crown. Transplanted pines and spruce shall be sprayed to prevent bark beetle infestation with a persistent formulation with the active ingredient Carbaryl, as specified on the USAF approved pesticide list. Spring-planted pine and spruce shall be sprayed within one week of transplanting. The Natural Resources Manager will be available to consult on spraying activities. All pesticide use shall be coordinated through the HAZMAT and Pest Management Coordinator. The contractor transplanting trees will be responsible for the required spraying for one year. The Contractor must include a listing of tree types and GIS coordinates for all trees transplanted to Environmental prior to closure of contract.

The following shrub and tree species are recommended for plantings where native species are required:

Shrubs for Replanting

Common Name	Scientific Name
Chokecherry	*Padus virginiana*
Mountain-mahogany	*Cercocarpus montanus*
Serviceberry	*Amelanchier alnifolia*
Wild rose	*Rosa woodsii*

Trees for Replanting

Common Name	Scientific Name
Ponderosa pine	*Pinus ponderosa*
Douglas-fir	*Pseudotsuga menziesii*
Colorado blue spruce	*Pice* a *pungens*
Rocky Mountain juniper	*Sabina scopulorum*

E. Unintentional vehicle collisions with larger wildlife (deer, bear, etc.).

1. If the mishap causes personal injury to vehicle occupants necessitating medical attention, call 911 immediately to initiate emergency response; call CCC at *474-3575/3558* to report the incident, CCC will forward the report to CMSFS Security Forces.

2. In accordance with Colorado Parks and Wildlife (CPW) directive (letter dated 12 May 2016), CMSFS officials have the discretion of determining whether the animal involved in the collision should be released or euthanized, depending upon the severity of its injuries. If a decision is made to euthanize the animal, CMSFS staff have the authority to perform that action per the above cited letter from CPW.

3. If the driver of the vehicle involved in the collision wants to salvage the meat of a euthanized animal, the driver must go to the CPW office at 4255 Sinton Road (227-5200) to obtain a free salvage permit. If the animal is a male, the head must be brought to 4255 Sinton Road to validate the permit.

4. If the driver does not want the meat, the CMSFS Fire Department should be contacted to allow them to file for the salvage permit.

5. Large road kill on NORAD Road must be reported to the NR Manager at 439-2447.

F. Bear Sightings and Aggressive Bear Incidents

1. Call CCC at 474-3575/3558 or 439-2447 NR Manager to report the sighting. For your personal safety, do not approach the animal.

2. Document any damage caused by the bear.

3. After hours CCC should contact Pueblo State Patrol at (719) 544-2441 to report a nuisance and potentially dangerous bear if the bear poses a threat to life and/or property.

G. Migratory Bird Treaty Act Compliance

1. Contractors shall take no action that will result in the disturbance and/or taking of migratory birds or active migratory bird nests, as defined in the Migratory Bird Treaty Act, 16 USC 703-712. If an active migratory bird nest is discovered in a tree or in tree branches that require removal, that tree will be marked as "off limits" to disturbance until the young birds have fledged and the nest is no longer active. If an active nest presents a human health or safety risk, or a security risk, a permit from the Migratory Bird Permit Office of the U.S. Fish and Wildlife Service will be required prior to removal of the nest. In such a case the CMSFS NR Manager will be notified as soon as possible to initiate the permit process. A list of federally protected migratory bird species may be found at 50 CFR Part 10.13.

H. Threatened & Endangered Species

1. No threatened or endangered plant or animal species have been identified to date at Cheyenne Mountain SFS. Additionally, the State of Colorado imposes no 'species of special concern' protective measures.

15.0 ASSOCIATED PLANS

Tab 1 – Wildland Fire Management Plan

Tab 2 – Bird/Wildlife Aircraft Strike Hazard (BASH) Plan, N/A

Tab 3 – Golf Environmental Management (GEM) Plan, N/A

Tab 4 – Integrated Cultural Resources Management Plan (ICRMP)

Tab 5 – Integrated Pest Management Plan (IPMP)